PLANT MATERIALS PROJECT SUMMARY REPORTS

from the Natural Resources Conservation Service to the National Park Service

FY 2013

U.S. DEPARTMENT OF THE INTERIOR • U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES, CONSERVATION SERVICE • NATIONAL PARK SERVICE

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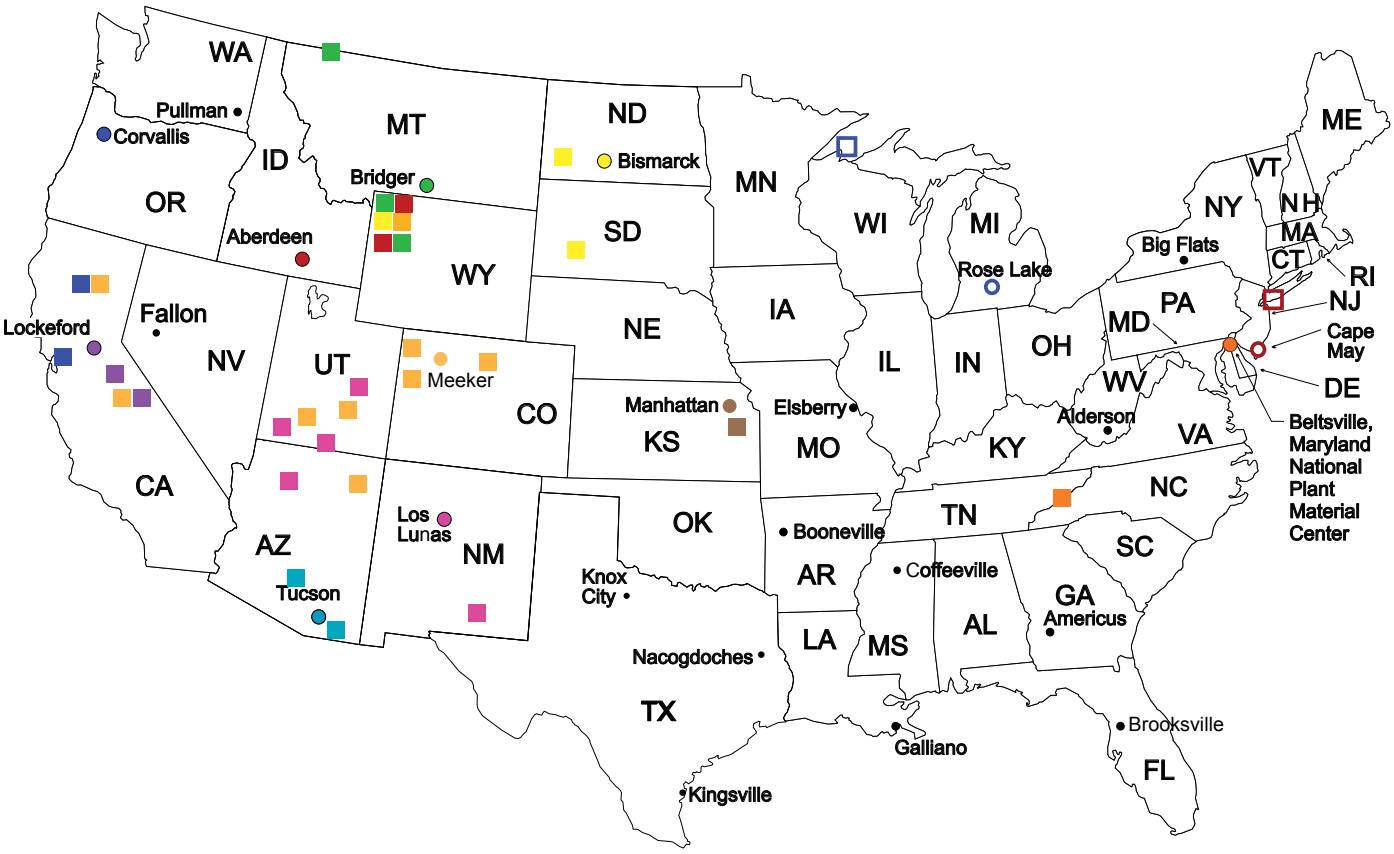


Plant Materials Center	In cooperation with these National Parks
Aberdeen, ID	Grand Teton, Yellowstone
Beltsville, MD	Great Smoky Mountains
Bismarck, ND	Badlands, Grand Teton, Theodore Roosevelt
Bridger, MT	Glacier, Grand Teton, Yellowstone
Cape May	Gateway
Corvallis, OR	Golden Gate, Lassen Volcanic
East Lansing, MI	Apostle Island
Lockeford, CA	Sequoia, Yosemite
Los Lunas, NM	Arches & Canyonlands, Carlsbad Caverns, Glen Canyon, Grand Canyon, Zion
Meeker, CO	Bryce Canyon, Canyon de Chelly, Capitol Reef, Colorado National Monument, Dinosaur, Lassen Volcano, Rocky Mountain, Yellowstone, Yosemite
Tucson, AZ	Coronado, Saguaro
Manhattan, KS	Tallgrass Prairie

INTRODUCTION

This is the 2013 Natural Resources Conservation Service (NRCS) Plant Materials Center (PMC) annual summary report on all interagency agreements between the National Park Service (NPS) and the Natural Resources Conservation Service. These projects relate to development of native plant materials for revegetation of park roads and other restoration projects. The National Park Service and the Natural Resources Conservation Service have been cooperating in testing and increasing native plant materials through a memorandum of understanding using interagency agreements since 1989.

The cooperating NRCS Plant Materials Centers and the Upper Colorado Environmental Plant Center (UCEPC) have prepared a park summary report for each of their projects. This report is a culmination of all of these individual reports. This summary report is made available by request and is sent to all national parks with current plant materials projects, associated park resource managers, respective plant materials centers, and US Department of Agriculture (USDA) NRCS state offices.

Additional printed copies or electronic versions of this report may be requested from Christine Taliga, acting NPS Plant Materials Technical Advisor, Denver Service Center-Transportation, 12795 West Alameda Parkway, Room 252, Lakewood, CO 80228; by e-mail: Christine_taliga@partner.nps.gov; or call 303.969.2349.

If you have questions or comments to improve the use and distribution of this report, please contact Christine Taliga, at 303.969.2349 or Robin Gregory, Revegetation Technical Advisor- Denver Service Center at 303.969.2456.

FISCAL YEAR 2013 PROGRAM SUMMARY

Technical Assistance

- The NRCS national technical advisor provided assistance to landscape architects, project specialists, and project managers at the NPS Denver Service Center relative to revegetation project needs for 11 national parks in addition to those with interagency agreements.
- The NRCS national technical advisor provided assistance to 30 different national parks and associated staff.

Development and Administration of Interagency Agreements

- Five new agreements, seven task orders, and five modifications to agreements were developed this year.
- A total of 43 interagency agreements were administered and coordinated.
- There were 32 active projects at 28 national park units that cooperated with 11 NRCS plant materials centers, and 1 conservation district plant materials center.

Native Seed and Plant Production

- 28 national parks
- 11,930 pounds of seed
- 12,200 container plants
- 193 park-collected native species grown

Park Collected Native Seed Processed

- 11 national parks
- More than 200 pounds of seed
- 122 different species collected

Interagency Agreements and Task Orders Reviewed

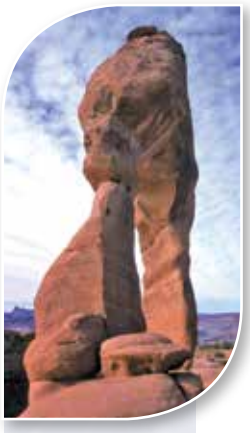
- Apostle Islands National Lakeshore, Arches and Canyonlands, Badlands National Park, Bryce Canyon National Park, Canyon De Chelly, Capital Reef National Park, Carlsbad Caverns National Park, Colorado National Monument, Coronado National Monument, Dinosaur National Monument, Gateway National Recreation Area, Glacier National Park, Glen Canyon National Park, Golden Gate National Recreation Area, Grand Canyon National Park, Grand Teton National Park, Great Smokey Mountain National Park, Lassen Volcanic National Park, Mount Rushmore National Park, Mount Rainier National Park, Rocky Mountain National Park, Padre Island National Seashore, Palo Alto National Historical Park, Sequoia and Kings Canyon National Park, Tallgrass Prairie National Preserve, Theodore Roosevelt National Park, Yellowstone National Park, Yosemite National Park, Zion National Park.
- **Cooperating NRCS Plant Centers:** Aberdeen, Idaho; Bismarck, North Dakota; Bridger, Montana; Beltsville, Maryland; Cape May, New Jersey, Corvallis, Oregon; East Lasing, Michigan; Los Lunas, New Mexico; Lockeford, California; Manhattan, Kansas; Tucson, Arizona.
- Cooperating Conservation District plant Center, Meeker , Colorado

Technology Transfer and Research

- Information provided included Federal Lands Transportation Program guidelines, examples of revegetation specifications, tools (seed collection techniques, seed storage, plant salvage, propagation, cost estimates, monitoring, etc.). Links to the NRCS Plant Materials Program, NRCS Electronic Field Office Technical Guide, and plant propagation protocol websites were provide at training sessions and as requested.
- Seed collection training workshops to more than 20 NPS staff personnel, in five national parks.
- The NRCS national technical advisor and program staff prepared and distributed 200 copies of the fiscal year 2012 annual interagency summary report to cooperating parks, plant material centers and key NPS and NRCS personnel.

INTERMOUNTAIN REGION

Arches and Canyonlands National Parks, Utah



Prepared by: **Los Lunas, New Mexico, USDA NRCS Plant Materials Center**

Introduction. On, August 27, 2010, an agreement was made between the US Department of the Interior, National Park Service (NPS) Southeast Utah Group (Arches and Canyonlands National Parks) and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) for the collection of native seed, the propagation of those seeds, and the increase of native grass species at the LLPMC.

The agreement states that the National Park Service will use the seed produced by the LLPMC for identified project areas in the two national parks. Populations of Indian ricegrass (*Achnatherum hymenoides*) were identified and collected by the park staff and sent to the LLPMC for conditioning and for future seed production.

Accomplishments. The following table lists the amount of acreage specified in the agreement, the amount of seed received and produced in 2013.

2013 Seed Received:

Arches National Park				
Common Name	**Scientific Name**	**Park Location**	**Harvest Year**	**Pounds Cleaned (Bulk)**
Indian ricegrass	*Achnatherum hymenoides*		2010	0.20
Indian ricegrass	*Achnatherum hymenoides*		2013	1.28

Canyonlands National Park				
Common Name	**Scientific Name**	**Park Location**	**Harvest Year**	**Pounds Cleaned (Bulk)**
Indian ricegrass	*Achnatherum hymenoides*	Island In the Sky	2013	0.90
Indian ricegrass	*Achnatherum hymenoides*	Needles	2010	0.10
Indian ricegrass	*Achnatherum hymenoides*	Needles	2012	0.38
Indian ricegrass	*Achnatherum hymenoides*	Needles	2013	0.30

2013 Seed Produced:

Arches National Park			
Common Name	**Scientific Name**	**Park Location**	**Pounds Cleaned (Bulk)**
Indian ricegrass	*Achnatherum hymenoides*		0.20

Canyonlands National Park			
Common Name	**Scientific Name**	**Park Location**	**Pounds Cleaned (Bulk)**
Indian ricegrass	*Achnatherum hymenoides*	Island In the Sky	10.4
Indian ricegrass	*Achnatherum hymenoides*	Needles	3.9

As a result of a discussion with the Southeast Utah Group in 2013, 0.5 acres of the Arches National Park Indian ricegrass in Field 26N at the LLPMC was removed. This field was destroyed after the presence of an unknown Indian ricegrass established itself in the seed production field. The seed harvested in 2013 from Field 27N and 26N were harvested together causing all seed to be contaminated from Arches National Park.

Due to the high amount of dormant seed (commonly associated with Indian ricegrass, especially in the first year after harvest and the limited amount of the seed received from Arches and Canyonlands) plant establishment in the Indian ricegrass fields was low. This caused an increase in maintenance of the seed production fields, especially during the growing season.

The low percentage of stand in the production fields required extra herbicide applications and increased weeding throughout the growing season. Spot spraying with herbicide, hand-weeding, and cultivation was performed on an average of every two weeks in 2013. The extra treatments for these fields required approximately two times the amount needed for a normal, fully established seed production field. Low percentages of germination and small amounts of seed from the wild collections can lead to extra resources to produce the amount of seed needed to fulfill agreement requirements.

In 2014, the LLPMC will have germination tests performed on the Indian ricegrass seed that was received in 2013 from Arches and Canyonlands along with the seed harvested at the LLPMC in 2013. Depending on the results of the germination tests, the LLPMC will decide how to establish the remaining acreage of the Indian ricegrass field, either by growing transplants in the greenhouse or by direct seeding.

Canyonlands National Park 'Needles' Indian ricegrass seed production field F33N

Bryce Canyon National Park, Utah

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. ID/IQ Contract No. AG-8B05-C-12-0002 was initiated June 26, 2012. Task Order No. P12PD12573 identified Upper Colorado Environmental Plant Center (UCEPC) to manage native seed production of two 0.5-acre fields; Indian ricegrass, *Achnatherum hymenoides*, and nodding brome grass, *Bromus anomalus* for Bryce Canyon National Park (BRCA). This task order will remain in effect until December 31, 2015.

Accomplishments. The 0.5 acre of nodding brome grass has been in production since 2009. The table below provides information for the last three years of production. The field receives a fertilizer application of 30-10-5-5, at 35 gallons per acre. An herbicide treatment of Buctril, 2,4-D and methylated seed oil is applied in the spring to help control broad leaf weeds. Weeds are suppressed by use of duck foot sweep cultivator blades and hand roguing methods. Furrow irrigation is applied throughout the growing season and into the fall. An unknown brome has been a major contaminant in this field since the original planting. Because the seed production has continued to be low, UCEPC planted a 0.7-acre field of *Bromus anomalus* on August 5, 2013. A portion of the seed from a 2011 lot of BRCA nodding brome, previously produced at UCEPC, was treated with Dividend to help protect from smut. Twenty pre-shaped beds were drilled by hand. A Planet Junior Seeder set at 30 seeds per linear foot a row was used to complete the task. Irrigation was applied immediately after the planting.

The 0.5 acre of Indian ricegrass produced 98 grams of seed in 2012. That fall, staff used this amount to inter-seed the existing rows. In July of 2013, the field was harvested and 19.5 bulk pounds of seed had been produced. This field is hand rogued for weed suppression and irrigated with overhead sprinkles. UCEPC will send seed samples of both materials to a certified seed laboratory for viability testing. Those results can be made available upon request.

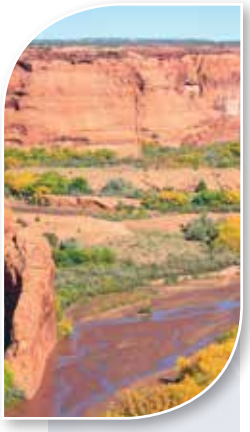
The following table provides information on the two fields under management for BRCA and their materials being held on inventory at UCEPC.

Species	Lot No.	Field Size	Bulk lbs	PLS %	PLS lbs	Date Tested
BRAN	2011	0.5 acres	191	31.36	**59.9**	1/30/12
BRAN	2012	0.5 acres	3.5	36.01	**1.26**	1/22/13
BRAN	2013	0.5 acres	28	50.77	**14.22**	3/7/14
ELTR	2004	N/A	7.5	58	**4.35**	9/1/04
ELTR	2005	N/A	9	61.81	**5.56**	3/1/06
ELTR	2007	N/A	499	74.16	**370**	2/8/08
ELTR	2008	N/A	137.5	61.18	**84.12**	2/19/09
ACHY	2012	0.5 acre	98 grams	UA	**UA**	Replanted
ACHY	2013	0.5 acre	19.5	36.38	**7.09**	3/7/14

* Several BRCA collections <25 grams remain on inventory Indian ricegrass, rabbitbrush, squirreltail, black sage and Stipa comata.

Technology Development. Standard cultural practices, harvest, and cleaning protocols were used to produce seed of *Achnatherum hymenoides* and *Bromus anomalus*.

2013 Bryce Canyon National Park
Achnatherum hymenoides



Canyon de Chelly National Monument, Arizona

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. Revegetation of Route 10 and South Rim Road Base Indefinite Delivery/ Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002 Task Order P12PD11781 was awarded to Upper Colorado Environmental Plant Center (UCEPC) on June 11, 2012. The ID/IQ replaced Requisition Reference No. R739010032 and IA No-1211-08-003. The scope of work stated that UCEPC maximize native grass seed production from two fields currently in production: Indian ricegrass *Achnatherum hymenoides* and western wheatgrass *Pascopyrum smithii*. Both fields had been previously established from seed stock collected at the monument. The ID/IQ was complete December 31, 2012.

Accomplishments. 74.5 pounds of *Achnatherum hymenoides* and 19.5 pounds of *Pascopyrum smithii* was shipped on February 15, 2013, to Mick Castillo. This shipment completes all work and services for the above task order. There has been no discussion to initiate a new contract. Both fields of CACH material were removed in the spring of 2013. Seed held on inventory for CACH is listed below.

Canyon De Chelly Seed Inventory.

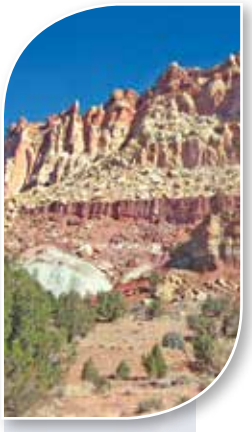
Species Symbol	Harvest Year	Field Size	Amount Cleaned Seed (Bulk)	PLS %	Amount PLS on Hand	Date Tested
ACHY	2010	1.73 acres	41 lbs	8.43	0.59 lbs	12/9/2010
ACHY	2011	"	133 lbs	53.91	71.7 lbs	10/28/2011
PASM	2010	1.27 acres	311.5 lbs	77.55	241.6 lbs	1/10/2011
PASM	2011	"	611 lbs	61.85	378 lbs	2/17/2012

Technology Development. Cultural practices, harvest, and cleaning protocols were utilized to handle the western wheatgrass and Indian ricegrass seed. Seed analysis reports and seed on inventory is available upon request of Canyon de Chelly National Monument. This will be the final report for Canyon de Chelly National Monument.

Canyon de Chelly National Monument Indian Ricegrass 2012

Capital Reef National Park, Utah

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**



Introduction. This report is in reference to NPS IA 1211-11-02, NRCS 67-8B05-A-11-07. Project Title: Scenic Drive Rehabilitation. This agreement was signed in December 2010. The agreement identified Upper Colorado Environmental Plant Center (UCEPC) to propagate native plants from seed of selected species required by the National Park Service for this project. From the selected species list, 6,000 grasses, 1,200 forbs, 400 shrubs and a mixture of 100 plants (7,700 total) were to be delivered to Capitol Reef National Park (CARE) in 2012. CARE collected germplasm from plant populations within the park and sent the seed to UCEPC for cleaning, production, and storage.

Accomplishments. In May of 2012, UCEPC staff delivered 8,814 plants to CARE. Twenty three species had been propagated in pre-determined containers. Wildlands, Inc., began revegetation efforts the following day. CARE volunteers provided irrigation to the plants through September. Those products that did not have sufficient growth to be out planted were kept at UCEPC and allowed to grow in the lathouse/greenhouse for an additional year. On August 3, 2013, UCEPC and CARE staff met in Green River, Utah, to exchange the 83 plants that remained at the center. The targeted goal was exceeded by 1,197 plants. With this delivery the contract is complete and this will be the final report.

Below is the list of species delivered to Capitol Reef National Park in 2012 and 2013.

Species	2012 Delivery	2013 Mini Tree Pot	Species	2012 Delivery	2013 Delivery 9" Cone	2013 Mini Tree Pot
ACHY	377		**TECA2**	1		
PLJA	908		**ERCO**	690		2
HECO	255		**GASP**	183		
ELEL	996		**SPPA2**	36		
PEUT	16		**SPAI**	2705		
ENNU	401	1	**ATCO**	8	48	7
CRFL5	110	2	**BOGR2**	464		
CHVI	134		**PSSP**	122		
CIUN	278		**ARPU9**	756		13
FAPA	11		**STPI**	67		
PUME	222		**YUHA**	19		
HYRIF	68		**HYAC**			23

Delivery to Capitol Reef National Park, May 7, 2012

Carlsbad Caverns National Park, New Mexico

Prepared by: **Los Lunas, New Mexico, USDA NRCS Plant Materials Center**

Introduction. On August 23, 2004, an agreement was made between the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) and the Carlsbad Caverns National Park (CCNP) for the collection, propagation, and the increase of native grass species. A new agreement began in 2010 that provides for the propagation of transplants and seed increase by the LLPMC for CCNP native grass species.

Accomplishments. The following table lists the CCNP pure live seed (PLS) on inventory at the LLPMC:

Common Name	Scientific Name	Plant Symbol	Accession Number	PLS on Inventory (lbs)	Test Date
blue grama	*Bouteloua gracilis*	BOGR	9066604	13.85	1/24/07
				8.12	1/09/08
				2.79	6/17/10
				2.59	12/01/09
				8.60	12/15/11
green sprangletop	*Leptochloa dubia*	LEDU	9066658	27.40	1/25/11
				14.38	12/07/11
plains bristlegrass	*Setaria vulpiseta*	SEVU2	9066606	17.37	5/15/08
				71.99	7/13/10
				24.04	2/12/10
				14.53	12/08/10
				46.03	1/03/12
purple threeawn	*Aristida purpurea*	ARPU9	9066607	7.9	4/23/08
				3.04	6/11/10
				0.54	5/18/10
				3.36	1/06/12
sideoats grama	*Bouteloua curtipendula*	BOCU	9066605	41.29	1/19/06
				36.34	1/23/07
				17.14	3/10/08
				40.08	6/29/10
				13.54	12/23/09
				9.72	1/25/11
				0.74	1/03/12
				3.00 (bulk)	No test[1]
				1.02 (bulk)	No test2[1]
				0.40 (bulk)	No test3[1]

This agreement expired in 2012. Carlsbad Caverns National Park seed (see table) will be stored at the LLPMC until the park submits a request for the seed.

[1]Seed not sent for testing due to an insufficient amount of seed or seed was from the collection made at Carlsbad Caverns National Park.

Colorado National Monument, Colorado

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

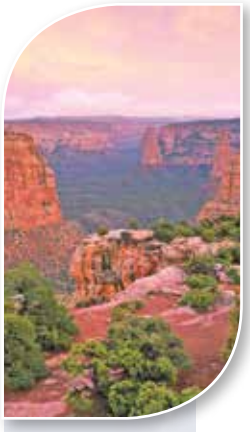


Photo credit: Rob Kurtzman

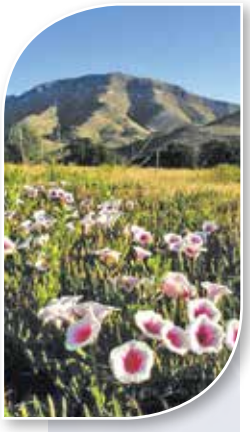
Introduction. This report covers activities that have been conducted by Upper Colorado Environmental Plant Center (UCEPC) for Colorado National Monument (COLM) through an Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order P12PD12930 signed July 11, 2012. This contract was amended on July 19, 2013, to produce seed of one species, Indian ricegrass, through 2015. If adequate seed collections can be obtained from the monument, a second species, Sandberg bluegrass or bottlebrush squirreltail, may be added to the contract. This agreement will remain in effect until December 31, 2015.

Accomplishments. On June 18, 2013, Steve Parr with UCEPC provided a day of Seed Collection Training to monument staff in order for them to confidently collect seed of targeted production species. Some seed had been successfully collected through assistance via correspondence and photos prior to the training, and reassurance of species identification, collection methods, and procedures were reviewed in addition to obtaining good collections of Indian ricegrass. For the most efficient collection of native products, it was emphasized how important it is to get populations identified early and monitor the maturation of the seed, collect the seed, dry the seed down and ship it for cleaning, testing and planting.

Seed was collected and cleaned during the field season, and on October 2, 2013, 1.5 acres of Colorado National Monument Indian ricegrass was planted in Field 17.

Technology Development. There is no new technological advancements to report for this project at this time.

Terri Blanke and seed collection crew



Coronado National Memorial, Arizona

Prepared by: **Tuscon, Arizona, USDA NRCS Plant Materials Center**

Introduction. This agreement was initiated July 17, 2009, for the propagation of 5,000 containerized plants of Palmer's agave (*Agave palmeri)*. Tucson Plant Materials personnel delivered a total of 5,100 Palmer's agave to park personnel by August 2012. A modification to this agreement was finalized in August 2013 requiring the production of an additional 1,300 containerized Palmer's agave.

Accomplishments. Plant production was initiated in August 2013. Seeds collected at the memorial were pre-soaked in water for 12 hours, drained and then placed into trays containing a mixture of peat moss and perlite. Trays were placed in the greenhouse for maintenance. Emerging seedlings were planted into 3"x 5" Zipset Plant Band containers during the winter of 2013. The containerized agave will be maintained at the Tucson Plant Materials Center until the expected delivery date of July 2014.

Emerging Palmer's agave seedlings

Dinosaur National Monument, Utah

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. Upper Colorado Environmental Plant Center (UCEPC) and the National Park Service entered into and signed the Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract No. AG-8B05-C-12-0002 in March 2013. Task Order No. P13PD02856, also known as Wetland Mitigation for Streambank Stabilization, Dinosaur National Monument (DINO). DINO PMIS 59763, identifies the scope of work to be performed by UCEPC. An existing overlook area in DINO has been identified as a mitigation site for floodplain restoration. Native, local-ecotype, riparian plant materials with genetic origins will be collected by UCEPC from this vicinity of the park and grown off-site as vegetative propagules for two growing seasons. A total of 100 local ecotype plants are to be delivered to the park by December 31, 2014, for restoring the road turnoff area back to native vegetation. The following is a list of potential plant species UCEPC will target for propagation by means of seed, cuttings, division, or transplants.

Species	Common Name
Cornus sericia	Redosier Dogwood
Crataegus sp.	Hawthorn
Prunus virginiana	Chokecherry
Populus sp.	Cottonwood
Rhus trilobata	Three-leaf sumac
Ribes sp.	Golden currant
Rosa woodsii	Woods rose
Sherpherdia argentea	Silver buffaloberry
Symphoricarpos occidentalis	Snowberry

Accomplishments. UCEPC staff began collection efforts from two separate sites within DINO on May 14, 2013. A total of 180 wildling shrubs were harvested from the Cross Mountain parking lot and 110 wildlings and cuttings were harvested at the Deer Park-Little Snake Overlook. Staff dug wildlings by hand and placed mud balls around the roots. The wildlings were transported in coolers and buckets with damp burlap bags to help retain moisture. The cuttings and larger wildlings were placed directly into buckets with water while they were transported back to UCEPC. All the cuttings and wildlings were transplanted over the next two days. Various size containers were selected for the grow-out to appropriately match the size and shape of the vegetative propagules. The following table provides information from an inventory completed on September 12, 2013. It provides the species, collection location, live count, and container size.

Dinosaur National Monument native riparian plants

Species	Total	Container Size in Inches					Collection Site
		2.5x2.5x10	4x4x10	4x4x14	1 Gal	3 Gal	
Cornus sericia	15			15			Deer Park/LSO
Crataegus sp.	10	1		9			Deer Park/LSO
Prunus virginiana	5	2		3			Cross Mtn.
Rhus trilobata	4			3		1	Cross Mtn.
Ribes ssp.	15				15		Cross Mtn.
Rosa woodsii	25	25		3		1	Cross Mtn.
Shepherdia argentea	7	2	1	1	3		Cross Mtn.
Symphoricarpos occidentalis	22				22		Deer Park/LSO
Total	**103**	**30**	**1**	**31**	**40**	**1**	

UCEPC staff harvesting *Shepherdia argentea* wildlings for Dinosaur National Monument

Glacier National Park, Montana

Prepared by: **Bridger, Montana, USDA NRCS Plant Materials Center**

Introduction. The Bridger Plant Materials Center (BPMC) has maintained a cooperative agreement with Glacier National Park since FY 1986. This agreement facilitates the collection, increase, and establishment of indigenous plant materials, and the development of technologies for the restoration of disturbances resulting from road construction and other projects within park boundaries.

Accomplishments. In 2013, 98 seed lots representing 51 species were delivered to Glacier National Park (GNP) or used for BPMC seed increase. Total weight of seed delivered was 2.773 kilograms (6.11 pounds). Seed distribution included 24 grasses (11 species), 51 forbs (29 species), and 23 woody plants (11 species). In addition, 295, 7-cubic-inch Cone-tainers™ of Arctostaphylos uva-ursi (9078619-LP), 314 *Mahonia repens* (9081475-LP), and 22 *Poa alpina* (9054561-LP) were mailed to the park. A total of 25 wildland seed collections (43 bags) were processed at the BPMC and are reported in the 2013 Glacier Annual Technical Report.

Three new grass seed increase fields were plugged into Field 4 on June 20 using the Carbon County Conservation District mechanical tree planter (see photo above). Plugs were installed 1 foot apart in rows that were spaced 30 inches apart. Species included *Bromus vulgaris* (9088297-MG), *Elymus glaucus* (9075846-SML), and *Trisetum spicatum* (9081997-SML). In addition, *Eurybia conspicua* (9088061-SML) and *Symphyotrichum laeve* (9078464-MGL) were plugged into Field 5 on June 20 using the same planter.

Approximately 200 plugs each of *Phleum alpinum* L. (9054559-LP) and *Poa alpina* (9054561-LP) were hand planted in Field 2 on May 20 and 21, in order to fill row gaps from the preceding establishment year.

Since renovation operations in the fall of 2012 had no positive effect on 2013 seed production of *Eurybia conspicua* (9087433-LM) in Field 4, the stand will be removed in spring of 2014.

Active and new seed production fields as of December 31, 2013, appear in the following table.

Glacier National Park seed production fields at the BPMC, December 2013

Genus and Species	Accession Number	Site	Field	Date Field Planted	Field Size acres	2012 Harvest kg
Bromus vulgaris	9088297	MG	4	6/20/2013	0.06	New
Carex microptera	9087799	LM	4	6/7/2011	0.03	0.018
Elymus glaucus	9075846	SM-L	4	6/20/2013	0.06	New
Eurybia conspicua	9088061	SM-L	5	6/20/2013	0.05	New
Eurybia conspicua	9087433	LM	4	6/21/2005	Remove	0.039
Phleum alpinum	9054559	LP	2	8/03/2012	0.03	New
Poa alpine	9054561	LP	2	8/13/2012	0.03	New
Symphyotrichum laeve	9078605	LM	4	8/15/2012	0.04	New
Symphyotrichum laeve	9078464	MG-L	5	6/20/2013	0.05	New
Trisetum spicatum	9081997	SM-L	4	6/20/2013	0.06	New

The container plants sown and held in cold storage at the BPMC, December 2013, are listed below.

Container plants sown and held in cold storage at the BPMC, December 2013

Species	Accession Number	Glacier Number	Collection Location	Date Sown	Number of Units	Size Container cubic inches
Acer glabrum	9081615	12-086	LM-L	2/5/2013	462	7
Acer glabrum	9088296	12-090	SM-L	2/5/2013	588	7

Container plants mailed to Glacier National Park, September 2013, are listed below.

Container Plants Mailed to Glacier National Park, 2013

Species	Accession Number	Glacier Lot Number	Collection Location	Date Sown	Number of Units	Size Container cubic inches
Arctostaphylos uva-ursi	9078619	08-154	LP	10/26/2012	295	7
Mahonia repens	9081475	10-146	LP	10/26/2012	314	7
Poa alpina	9054561	2001 Increase	LP	2/4/2013	22	7

Technology Development and Assistance. Due to the small size of the 2013 harvest for *Eurybia conspicua (*9087433-LM), it was not sent in for seed analysis. The remaining four 2013 increase seed lots were sampled and sent to the Montana Seed Lab, MSU-Bozeman, for analysis. They included *Carex microptera* (9087799-LM), *Phleum alpinum* (9054559-LP), *Poa alpina* (9054561-LP), and *Symphyotricum laeve* (9078605-LM). In addition, seed tests were conducted on the BPMC Increases of 2006 *Achillea millefolium* (9063640-LM), two - 2012 *Elymus trachycaulus* lots (9087790 and 9088099-LM), 2007 *Geum macrophyllum* (9087654-LM), 2005 *Phleum alpinum* (9054559-LP), 2002 *Poa alpina* (9057881-LP), and 2001 *Pseudoroegneria spicata* (9054561). Germination or tetrazolium test (TZ), and percentage purity were included. Results from these 11 tests are included in the "Trials Conducted" segment of the Glacier Park 2013 Annual Technical Report.

Planting Glacier National Park *Bromus vulgaris* plugs for seed increase with a tree planter

Glen Canyon National Recreation Area, Arizona

Prepared by: **Los Lunas, New Mexico, USDA NRCS Plant Materials Center**

Introduction. In 2013, an agreement was made between the US Department of the Interior, National Park Service, Glen Canyon National Recreation Area (GCNRA) and the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) for the collection of native seed, the propagation of those seeds, and the increase of native grass, shrub and tree species at the LLPMC.

The agreement states that the National Park Service will use the seed and transplants produced by the LLPMC for identified project areas at GCNRA. Populations of native grass, shrub and tree species will be identified by the park staff, and seed of the identified species will then be sent to the LLPMC. These collections will then be conditioned and used by the LLPMC in seed increase plantings or transplant production.

The following tables list the species specified in this agreement and the amount of seed received by the LLPMC from the GCNRA:

Glen Canyon National Recreation Area accessions and amount of seed received at the LLPMC

Common Name	Scientific Name	Plant Symbol	Accession Number	Amount Received
Grasses				
purple threeawn	*Aristida purpurea*	ARPU9	9067016	4.86 grams
Shrubs and Trees				
arrowweed	*Pluchea sericea*	PLSE	9067027	18.2 grams
broom snakeweed	*Gutierrezia sarothrae*	GUSA2	9067023	16.8 grams
buckwheat	*Eriogonum corymbosum*	ERCO14	9067021	17.6 grams
fourwing saltbush	*Artiplex canescens*	ATCA2	9067020	96.3 grams
Fremont cottonwood	*Populus fremonti*	POFR2	9067025	not weighed
Goodding's willow	*Salix gooddingii*	SAGO	9067026	not weighed
rabbitbrush*	*Ericameria* spp.	ER spp.	9067024	16.4 grams
seepwillow	*Baccharis* spp.	BA spp.	9067022	5.18 grams
shadscale	*Atriplex confertifolia*	ATCO	9067019	274 grams

* The rabbitbrush seed appeared to contain four different species. One of the species appeared to be *ericameria nauseousa* and another one appeared to be *Isocoma*. The other two species could not be identified by seed alone.

The following table lists the amount of seed sent to the LLPMC for cleaning purposes only:

Glen Canyon National Recreation Area seed received (for cleaning and storage purposes only)

Common Name	Scientific Name	Plant Symbol	Amount Received for Cleaning & Storage
Grasses			
galleta	*Pleuraphis jamesii*	PLJA	0.76 grams
Trees, Shrubs, Forbs			
wirelettuce (A) small seed	*Stephanomeria* spp.	ST spp.	17.1 grams
wirelettuce (B) large seed	*Stephanomeria* spp.	ST spp.	3.8 grams

Accomplishments. The following tables list the GCNRA agreement acreage, the amount of the currently established seed production fields, and the amount of seed produced in 2013.

2013 Glen Canyon National Recreation Area seed production fields

Common Name	Agreement Acreage	2013 Acreage	Pounds Cleaned (Bulk)
purple threeawn	0.25	0.10	0.96

Transplant Production:

- Goodding's willow (*Salix gooddingii*) and seepwillow (*Baccharis* spp.) – It is anticipated that cuttings can be made from LLPMC stock during the winter to produce the 40 plants needed to meet the amount stated in the agreement.
- Purple threeawn – Plug transplants were grown from the seed received from GCNRA. These transplants were used to establish a 0.10 acre-seed production field at the LLPMC. In 2013, seed was harvested from the purple threeawn production field. The seed produced in 2013 will be used to increase the production field acreage in 2014.
- Rabbitbrush – The rabbitbrush seed appeared to contain at least four different species. One appeared to be *Ericameria nauseousa* and another appeared to be *Isocoma*. The other two species could not be identified from the seed alone.
- Shadscale – All of the seed was planted in spring of 2013 at a rate of 0.5 cup of seed per plug tray. Under greenhouse conditions, the seed did not germinate. As a result, the plug trays were placed in cold stratification for 12 weeks to help induce germination. A small amount of plants did germinate (10 plants per tray) after the cold stratification. Rodent predation was noticed in the germinated plants, and as a result, the plug trays were covered. However, there was not any new germination after the rodent damage. This seedlot appeared to have low viability, and because of this, additional collections may be required to meet the amount specified in the agreement.

The following table lists the GCNRA amount of transplant production in 2013:

2013 Amount of transplants produced for Glen Canyon National Recreation Area

Common Name	Scientific Name	Agreement Request	Number of Transplants
arrowweed*	*Pluchea sericea*	0	130
buckwheat	*Eriogonum corymbosum*	750	800
fourwing saltbush	*Atriplex canescens*	1,000	1,750
Fremont cottonwood	*Populus fremonti*	50	45
Goodding's willow	*Salix gooddingii*	100	60
rabbitbrush	*Ericameria* spp.	750	1,150
seepwillow	*Baccharis* spp.	50	230
snakeweed	*Gutierrezia sarothrea*	500	1,050

* The arroweed (*Pluchea sericea*) was started in the spring of 2013 due to the uncertainty of being able to meet the salix and populus agreement amounts.

Glen Canyon National Recreation Area purple threeawn seed production field 21S

Grand Canyon National Park, Arizona

Prepared by: Los Lunas, New Mexico, USDA NRCS Plant Materials Center

Introduction. In July 1990, the National Park Service made an agreement with the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) to collect, propagate, and increase native grasses, forbs, shrubs, and trees. This agreement states that the LLPMC will produce the plant materials for the purpose of revegetating disturbed areas and native landscaping projects in Grand Canyon National Park (GCNP), which includes both the north and south rim areas of the park.

Accomplishments. In 2013 the LLPMC accomplished the following activities:

- Muttongrass – Grew plug transplants from the seed harvested at the LLPMC. These transplants were used to establish an additional 1.00 acre muttongrass production field.
- To improve the seed production of muttongrass, a split application of 100 lbs/acre of gypsum (CaSO4) was applied in 2013. Calcium deficiency can suppress seed development, and the application of CaSO4 may provide an increased harvest of muttongrass.
- Needleandthread – Grew plug transplants from the seed harvested at the LLPMC. These transplants were used to establish an additional 0.26 acre seed production field that increased the acreage from 0.33 acre to 0.59 acre.
- Indian ricegrass – Harvested seed from the 0.14 acre Indian ricegrass production field that was established in January 2012.
- Spike muhly – Grew plug transplants from the seed harvested from the seed production field at the LLPMC. These transplants were used to establish an additional 0.30 acre spike muhly seed production field that increased the acreage from 0.70 acre to 1.0 acre.

The following tables list the species currently established at the LLPMC, the amount of seed produced in 2013, and the amount of pure live seed (PLS) on inventory for the GCNP:

2013 Grand Canyon National Park seed production fields

Common Name	Scientific Name	Agreement Acreage	2013 Acreage
blue grama	*Bouteloua gracilis*	2.00	2.60
bottlebrush squirreltail	*Elymus elymoides*	0.50	0.00*
Indian ricegrass	*Achnatherum hymenoides*	0.50	0.14
muttongrass	*Poa fendleriana*	1.00	2.13
needle and thread	*Hesperostipa comata*	0.50	0.59
sideoats grama	*Bouteloua curtipendula*	0.50	0.00*
spike muhly	*Muhlenbergia wrightii*	0.50	1.0

*The bottlebrush squirreltail and sideoats grama fields were removed prior to 2011 as per agreement with Grand Canyon National Park.

2013 Seed Production for Grand Canyon National Park

Common Name	Scientific Name	Pounds Cleaned (Bulk)
blue grama	*Bouteloua gracilis*	50.7
muttongrass	*Poa fendleriana*	9.2
spike muhly	*Muhlenbergia wrightii*	2.1
needle and thread	*Hesperostipa comata*	9.0
Indian ricegrass	*Achnatherum hymenoides*	0.88

Grand Canyon National Park Pure Live Seed on Inventory at the Los Lunas PMC

Common Name	Scientific Name	Accession	Pure Live Seed On Inventory (lbs)	Test Date
blue grama	*Bouteloua gracilis*	9062875	2.07 14.96 4.23 28.93	11/17/2009 12/6/2010 11/17/2011 2/13/2013
blue grama	*Bouteloua gracilis*	9066803	8.43 4.38 23.66	1/28/2011 12/15/2011 2/13/2013
muttongrass	*Poa fendleriana*	9062861	2.00 0.14 74.71	9/17/2010 3/13/2012 12/20/2012
sideoats grama	*Bouteloua curtipendula*	9066732	0.50	12/04/09
spike muhly	*Muhlenbergia wrightii*	9066802	9.31 12.29 0.40	1/25/2011 1/24/2012 2/15/2013
needle and thread	*Hesperostipa comata*	9066655	3.97	3/28/2013

Technology Development.

Indian ricegrass – Due to the high rate of dormant seed commonly associated with Indian ricegrass, especially in the first year after harvest, and the limited amount of the seed the LLPMC received from GCNP, plant establishment in the Indian ricegrass field was very low. This required an increase in maintenance for this seed production field since seeding occurred in 2012 (see the following photograph). The low stand percentage in the production field meant extra herbicide applications and increased weeding throughout the growing season. Spot spraying of herbicide and hand weeding and cultivation was needed, on average, every two weeks during the 2013 growing season. The treatments for this field were possibly close to twice as much as needed for a normal, fully established seed production field at the LLPMC.

Muttongrass – As previously stated in prior Grand Canyon National Park reports, the LLPMC has evaluated new techniques to increase seed production for muttongrass. Increased irrigation and the addition of gypsum fertilizer to the muttongrass field did increase the seed production, but it has also increased the cost of growing this species. The muttongrass from GCNP does not perform well on the soils at the LLPMC, and the life span for seed production is, at best, three years. After that, seed production decreases dramatically and the mortality rate is very high. This requires continued evaluation of the need to re-establish new fields of the muttongrass to meet the acreage stated in the GCNP agreement. This also increases the cost for production of this species.

Grand Canyon National Park muttongrass established 1.0 acre seed production field 37S

Grand Canyon National Park muttongrass seed production field 33N

Grand Teton National Park, Wyoming

Prepared by: **Aberdeen, Idaho, USDA NRCS Plant Materials Center**

Introduction. The Aberdeen Plant Materials Center (PMC) entered into an interagency agreement with Grand Teton National Park (GTNP) in 2006 to produce seed of four native grasses for use in revegetation of disturbed areas following road construction. Seed fields of slender wheatgrass (*Elymus trachycaulus*), Sandberg bluegrass (*Poa secunda*), blue wildrye (*Elymus glaucus*), and mountain brome (*Bromus marginatus*) were planted in 2006, and seed was harvested in 2007 and 2008. Fields of Idaho fescue (*Festuca idahonensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) were planted in May 2008. Seed from these fields were harvested in 2009 and 2010. The bluebunch wheatgrass field was removed in late 2010 because of poor seed yield. In 2010, a second field of mountain brome was planted for seed harvests in 2011 and 2012. The mountain brome field was removed after harvest in 2012. The Idaho fescue field was also harvested in 2011–13 and is scheduled for its last harvest in 2014. A new Idaho fescue field (1 acre) was established in 2012 for seed production in 2013–14.

Accomplishments. Seed fields are sprinkler irrigated to supplement natural precipitation to approximate 18 to 20 inches of total annual moisture. Weeds were controlled during the growing season. The following table lists the species grown and seed still on hand at the end of 2013, field acreage, current seed inventory, seed shipments in 2013, and seed test date.

Species	Harvest Year	Field Size (ac)	Inventory PLS Pounds	Pounds Shipped 2013	Seed Test Date
Idaho fescue	2013	0.3	76		1/23/14
Idaho fescue	2013	1.0	71		1/23/14
mountain brome	2012	2.5	1001	800	2/1/13
Idaho fescue	2012	0.3	0	60	2/5/13
mountain brome	2011	2.5	0	66	9/19/11
Idaho fescue	2011	0.3	0	83	2/22/12
slender wheatgrass	2009	1.0	0	499	5/17/10
slender wheatgrass	2008	1.0	0	498	4/14/09
blue wildrye	2008	2.7	0	389	4/22/09
blue wildrye	2007	2.7	608	0	3/10/08

Grand Teton National Park new Idaho fescue seed increase field at Aberdeen PMC, April 2013

Grand Teton National Park Idaho fescue seed harvest at Aberdeen PMC, July 2013

Prepared by: **Bismarck, North Dakota, USDA NRCS Plant Materials Center**

Introduction. On June 1, 2010, the Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), Bismarck, North Dakota, entered into an interagency agreement with the National Park Service, Grand Teton National Park (GTNP) to grow and produce seed of bluebunch wheatgrass (*Pseudoroegneria spicata*), slender wheatgrass (*Elymus trachycaulus*), and mountain brome (*Bromus marginatus*) for use in revegetating Kelly Hay Fields. Fields were established at the PMC in 2010 with seed originating from the park. The original contract period was 2010 through 2012. The contract was extended for 2013 and 2014. Seed harvested from these fields will be distributed to the park for reclamation activities.

Targeted species and goaled seed amounts:

Species	Common Name	PLS Pounds
Pseudoroegneria spicata	bluebunch wheatgrass	100
Elymus trachycaulus	slender wheatgrass	720
Bromus marginatus	mountain brome	520

Accomplishments. Growing conditions were good in 2013. The fields were not irrigated in 2013. Seed harvest in 2013 of mountain brome and slender wheatgrass were good. The mountain bromegrass had very little smut, most likely due to less humid conditions. The bluebunch wheatgrass field was removed in 2013. The bluebunch wheatgrass did not establish well at this location. Mountain brome and slender wheatgrass seed was cleaned at the PMC and tested at the North Dakota State Seed Department.

No seed was distributed to the park in 2013.

Accession Number	Species	Seeding Date	Seeding Rate PLS (lb/acre)	Field Size (acres)
9094354	mountain brome	5/26/2010	10	1.0
9094353	slender wheatgrass	5/26/2010	5.5	1.0
9094352	bluebunch wheatgrass	6/26/2010	9.5	0.5

Seed production and distribution

Accession Number	Species	Date Planted	Field Size (ac)	2013 Seed Production (PLS lbs)	2013 Seed Harvest Date	Seed Distribution to Park in 2013 (PLS lbs)	Inventory Remaining as of 3/17/2013 (PLS lbs)
9094352	bluebunch wheatgrass	6/2/2010	0.50	Field removed	none	0.00	0.27
9094353	slender wheatgrass	5/26/2010	1.00	505	7/12/2013	0.00	1,939
9094354	mountain brome	5/26/2010	1.00	407	7/9/2013	0.00	1,219

Technology Development. Combine settings, seed cleaning procedures, and seed tests have been documented and are available from the PMC.

Harvesting Grand Teton National Park slender wheatgrass. The 1-acre field produced over 500 PLS pounds per acre in 2013

Prepared by: **Bridger, Montana, USDA NRCS Plant Materials Center**

Restoration of the Kelly Hay Fields. NRCS Contract Number: 67032511011.

Introduction. In 2011, the Bridger Plant Materials Center (BPMC) entered into a multiyear cooperative agreement with Grand Teton National Park for seed increase of four native grass species including Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg bluegrass (*Poa secunda*), and mountain brome (*Bromus marginatus*). Seed increase of each species was goaled for 1 acre, although bluebunch wheatgrass had only enough seeds for a 0.65-acre field based on the production requirement of 25 PLS seeds per foot of row. Additionally, because of high seed dormancy in Sandberg bluegrass, three seed increase fields of this species were sown in 2011 and another field sown in spring 2012. Project completion is anticipated in 2014.

Accomplishments. A total of six seed production fields of four species from Grand Teton were maintained at the BPMC in 2013. Of the six separate seed increase fields of four species planted in 2011, five were maintained in 2013. The *Poa secunda* 9088212 planted in Field 11 in 2011 failed to establish and was removed in late 2012. Seedling emergence of the other fields rated from excellent to fair by fall. On April 24, 2012, a field of *Poa secunda* 9090925 was planted in Field 20 totaling 1.0 acre. Total bulk seed production in 2013 by species also appears in the table on the following page.

Seed curing in the seed barn

Seed increase data of Grand Teton National Park seed lots, 2013

Species Symbol	Accession Number	Date Sown	No. of Rows	Area Planted acres	Location	2013 Bulk Seed Produced kg	Total Seed On-Hand kg
FEID	9088206	8/11/2011	40	1.00	Field 12	5.44	5.63
PSSPS	9088209	8/11/2011	32	0.65	Field 12	9.98	14.06
POSE	9088212	8/11/2011	24&28	1.30	2 sites Field 12	30.4	31.4
POSE	9088212	11/17/2011	20	0.50	Field 11	0	Same as above
BRMA4	9088217		40	1.00	Field 12	27.2	244.1
POSE	9090925	4/24/2012	20	1.00	Field 20	0	0.339

Erratic and frequent showers in 2013 had some impact on seed crop pollination and maturation at Bridger, including Grand Teton increase. All established Grand Teton fields produced some seed in 2013, although smut in the *Bromus marginatus* 9088217 resulted in high losses during cleaning. *Poa secunda* 9088212 did produce seed for the first time in 2013, although 9090925, did not.

Technology Development. Field sowing of seed increase crops at the BPMC has historically been in late winter or late fall (dormant). Mid-summer planting of grass seed production crops is a relatively new practice at the center, with promising results to date. Mid-summer sowing allows control of aggressive early-season weeds prior to planting of the target crop, which results in reduced competition for water and nutrients during the growing season. Stand health and performance of summer 2011-planted fields remained good in 2013, with the exception noted for *Poa secunda* 9090925.

Seed harvesting

Rocky Mountain National Park, Colorado

Produced by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. Upper Colorado Environmental Plant Center (UCEPC) and Rocky Mountain National Park (ROMO) initiated an Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order P12D11994, Bear Lake Road Revegetation on August 10, 2012. This agreement combined two previously separate production agreements and modified the acreage, species, and years for production. This agreement involves seed production of three forbs and six grasses for revegetation of Bear Lake Road Project for two years, with the reduction of two fields in 2013.

Accomplishments. This year, all nine target production materials were harvested for use in the revegetation of the Bear Lake Road Project. The grasses produced an impressive 2,535 clean pounds of seed. Two of the species, however, are shared germplasm with other entities and will be proportionately allocated as determined by separate agreements between the parties and with UCEPC. Two large seed shipments were delivered to Rocky Mountain National Park in 2013. One delivery on June 22, 2013, accounted for over 1,000 pls pounds, and there was a second delivery on August 24, 2013, which consisted of 210 pounds of clean grass seed that had been previously produced for Rocky Mountain National Park.

Seed production was excellent for bottlebrush squirreltail, Canada wildrye, and wooly brome, but is tailing off for the other products that have been established since 2003.

Species	Date	Clean Seed	PLS	Test Date	Process	Acreage
Mountain muhly						
Field Establishment	5/28/03		59.00 g		Planet Junior	0.50 acre
Harvest	9/11/12	4 lb	2.22 lb	12/20/12	Swather	
Harvest	9/20/13	7 lb	4.68	3/19/2014	Swather	
Shipment	8/22/12	82 lb				
Shipment	6/22/13	4.0	2.22			
Needle and thread						
Field Establishment	9/4/03	600 transplants			Transplanter	0.07 acre
	9/14/04	4,000 transplants			Transplanter	0.20 acre
	6/30/05	5,500 transplants			Transplanter	0.30 acre
Harvest	6/18/12	5.4 lb	1.8 lb		Flail Vac	
Harvest	6/28/13	5.5	No test	No test	Flail Vac	
Shipment	8/22/12	55.6 lb				
Shipment	6/22/13	5.4 lb	1.8 lb			
Prairie Junegrass						
Field Establishment	5/29/03	28 g			Planet Junior	0.20 acre
	9/15/04	4,000 transplants			Transplanter	0.20 acre
Harvest	7/5/12	1.5 lb	1.01 lb	1/4/13	Combine	
Harvest	7/15/13	354 g	No test	No test	Combine	
Shipment	8/22/12	41.8 lb				
Shipment	6/22/13	1.5 lb	1.01 lb			
Purple locoweed						
Field Establishment	5/28/03	203 g			Planet Junior	0.50 acre
Harvest	7/3/12	488 g	No test		Hand clipped	
Harvest	1/10/13	2.8	No test	N/A	Hand clipped	

Species	Date	Clean Seed	PLS	Test Date	Process	Acreage
Shipment	8/22/12	47.3 lb				
Shipment	6/22/13	488 g	N/A			
Rose pussytoes						
Field Establishment	5/18/09	550 Transplanted plugs				0.10 acre
Harvest	6/4/12	36 g	No test		Hand clipped	
Harvest	6/14/13	56 g	No test	N/A	Hand clipped	
Shipments	8/22/12	0.4 lb				
Shipment	6/22/13	36 g	N/A			
Bottlebrush squirreltail						
Field Establishment	6/23–24/09	7,500 Transplanted plugs				2.75 acre
Harvest	8/4–6/12	592 lb	538 lb		Combine	
Harvest	8/12/13	170 lb	135	3/12/2014	1.0 ac 2013	
Shipment	9/9/12	1,944 lb				
Shipment	6/22/13	592 lb	538 lb			
Canada wildrye						
Field Establishment	8/2/11	Direct seeded 4.25 lb				3.00 acres
Harvest	8/9/12	677 lb	459 lb		Combine	
Harvest	8/9/12	664 lb	418.3 lb	3/19/2014		1.5 acre, 2013
Shipment	9/9/12	1,093.5 lb				
Shipment	6/22/13	677 lb	459 lb			
Louisiana sage						
Field Establishment	7/4/11	300 Transplanted plugs				0.05 acre
Harvest	9/13/12	4.6 lb	3.38 lb	1/4/13	Hand clipped	
Harvest	9/20/13	2.0 lb	No test	N/A	Hand clipped	
Shipment	6/22/13	4.6 lb	3.38 lb			
Wooly brome						
Field Establishment	8/10/12	Direct seeded 7 lb			Planet Junior	2.50 acres
Harvest	8/5/13	719 lb	501.72 lb	3/6/2014	Combine	

The table above provides a complete recap of the activities conducted by UCEPC in 2012 and 2013. The agreement is complete and this is the final report for the Bear Lake Road Project.

Technology Development. Standard seed production practices were conducted in 2013.

Rocky Mountain
National Park
bottlebrush squrreltail

Saguaro National Park, Arizona

Produced by: **Tuscon, Arizona, USDA NRCS Plant Materials Center**

Introduction. This project originally involved the establishment of 0.5 acre of *Aristida purpurea* and 0.25 acre of *Abutilon incanum*. In May 2012, the agreement was amended to remove the production requirement of *Abutilon incanum* due to insufficient viable seed. Seed harvested from the *Aristida purpurea* field will be used in revegetation projects within Saguaro National Park. The final signature on the amendment was in May 2012 with the agreement continuing until September 30, 2015.

Accomplishments. PMC personnel received the *Aristida purpurea* seed for this project in March 2011. There were 35 individual *Aristida purpurea* collections with varying collection years (1999–2010). The total seed received was 519 grams. Approximately 1,900 plugs of *Aristida purpurea* were started in July 2011 using 26 of the individual seed collections. A 0.5-acre field of *Aristida purpurea* was established in September 2011. Individual collections were planted into known distinct locations within the field. Field observations in late 2011 indicated that collections 825 and 865, both collected in 2002, were heartier, with more vegetation production than the other collections. The remaining accessions died in the field during the winter of 2011.

In late April 2012, additional plugs of *Aristida purpurea* were planted and grown for re-establishment of the field. The majority of the seed used for the re-plant were the accessions 825 and 865. Planting of additional plugs using additional accessions continued through July to ensure adequate plants were available for full re-establishment of the production field. The field was replanted in September 2012. Five harvests of the field were conducted in 2013. A sixth and final harvest will take place in 2014. This will fulfill the agreed upon obligations specified in the agreement.

***Aristiada purpurea* harvests conducted at the Tucson PMC in 2013**

Bulk lbs	Harvest Dates				
	5/15/2013 60.50	5/30/2013 20.00	6/26/2013 39.00	7/14/2013 30.00	12/17/2013 31.00
Germination %	58	45	49	55	11
Dormant %	16	28	24	24	40
Purity %	93	94	79	94	46
PLS %	69	68	58	74	23
PLS Pounds	41.51	13.69	22.49	22.20	7.25

Aristida purpurea harvest in May 2013

Aristida purpurea field in September 2013

Yellowstone National Park, Wyoming

Prepared by: **Aberdeen, Idaho, USDA NRCS Plant Materials Center**

Introduction. In 2008, the Natural Resources Conservation Service (NRCS), Plant Materials Center (PMC), Aberdeen, Idaho, entered into an interagency agreement with the National Park Service and Yellowstone National Park (YNP) to produce seed of Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and needleandthread (*Hesperostipa comata* ssp. *comata*) for use on restoration sites at Yellowstone National Park. The needleandthread was harvested as hay mulch and baled for transport in 2010–12. Seed was harvested from the Sandberg bluegrass field in 2010–13 and bluebunch wheatgrass field in 2011–13. New seed fields of bluebunch wheatgrass and Sandberg bluegrass were established in 2013 and will produce seed in 2014 and 2015.

Accomplishments. New, 2.5-acre seed fields were planted in May 2013. Sandberg bluegrass was planted in Field P2E and the bluebunch wheatgrass was planted in Field P2W, both at the PMC Pearl Farm. Soils at the PMC Pearl Farm are Kimama silt loam with pH of 7.4 to 8.4. Average annual precipitation is 9.39 inches and seed fields are sprinkler irrigated to supplement natural precipitation to approximate 18 to 20 inches total annual precipitation. Establishment of the new seed production fields were rated fair to good. The fields established in 2009 were harvested for the last time in 2013 and returned to fallow. The following table lists the species grown for Yellowstone National Park, field acreage, current seed inventory, and seed shipped during 2013.

Species	Harvest Year	Field Size (ac)	Inventory PLS Pounds	Pounds Shipped 2013	Seed Test Date
Sandberg bluegrass	2013	1.0	74	0	3/10/14
Sandberg bluegrass	2012	1.0	17	35	2/25/13
Sandberg bluegrass	2011	1.0	0	95	2/22/12
Sandberg bluegrass	2010	1.0	0	58	3/28/11
Bluebunch wheatgrass	2013	1.0	76	0	3/25/14
Bluebunch wheatgrass	2012	1.0	0	110	2/5/13
Bluebunch wheatgrass	2011	1.0	29	49	2/29/12

Yellowstone National Park Sandberg bluegrass seed harvest drying on floor at Aberdeen PMC, 2013

Harvesting Yellowstone National Park bluebunch wheatgrass at Aberdeen PMC, 2013

New Yellowstone National Park bluebunch wheatgrass field at Aberdeen PMC, September 2013

Prepared by: **Bridger, Montana, USDA NRCS Plant Materials Center**

Gardiner Basin

Introduction. The agreement was developed to address issues associated with enhancing critical wildlife habitat in the Gardiner Basin. The project facilitates seed production of native grasses at the Bridger Plant Materials Center (BPMC), along with establishment and evaluation of restoration test plots on a small portion of the land formerly used for agricultural production and acquired by Yellowstone National Park in the 1930s. Points of interest include effectiveness of various weed control methods, seeding techniques, and plant performance.

Accomplishments. The majority of seed on inventory for the Gardiner Basin project was assembled mid-September 2013 in preparation for planting the 22-acre site at Cinnabar. A total of 473 pounds pure-live-seed was picked up by Yellowstone National Park personnel at the BPMC for planting the week of October 21. There are currently 19 pounds of seed of two native grasses on inventory. This consists of approximately 2 pounds of wildland-collected seed from the Carbella site (three lots of two species) and 17 pounds of Sandberg bluegrass produced at the BPMC. There are currently three seed increase fields (2.25 acres) at the BPMC. A seed increase field of bluebunch wheatgrass was removed due to natural decline in production.

2013 Yellowstone National Park Gardiner Basin seed increase at Bridger PMC

Species	Accession	Lot Number	Field Size acre	Harvest Date	Bulk Amount (lbs)	% Pure Live Seed	Test Date
Elymus trachycaulus	9081525/526	SCO-13-YNP-41	1.00	7/14	320.00	97.82	10/15/13
Poa secunda	9090791	SCO-13-YNP-64A	0.96	6/21	12.13	79.93	10/21/13
Poa secunda	9090791	SCO-13-YNP-64B	—	6/21	4.60	49.76	10/21/13
Pseudoroegneria spicata	9087860	SCO-13-YNP-148	0.79	7/12	4.32	98.14	10/08/13

Seed harvest of Yellowstone National Park's Sandberg bluegrass (*Poa sandbergii*) at the Bridger PMC

Technology Development. In April 2013, randomized and replicated Comparative Evaluation Plantings were established at the Cinnabar site and at the BPMC in order to test plant growth and establishment of five indigenous grasses and five heritage-variety grasses in support of Dr. Bill Hamilton's ongoing genetic analysis. At Cinnabar, the average performance rating was highest for YNP bluebunch wheatgrass, followed by "Pryor" slender wheatgrass, "Lodorm" green needlegrass, and "Rimrock" Indian ricegrass. There were no seedlings of YNP green needlegrass or Indian ricegrass. Very few desert alyssum plants were present in the Cinnabar study area, which was burned in September 2011. At the BPMC, the average performance rating was highest for Pryor slender wheatgrass, followed by YNP slender wheatgrass, Lodorm green needlegrass, YNP bluebunch wheatgrass, and both entries of Indian ricegrass.

The seed agglomeration treatment study was evaluated in 2013. At Cinnabar, stem counts of bluebunch wheatgrass and Sandberg bluegrass were slightly higher in nontreated plots than treated plots. Stem counts of needle and thread were slightly higher in the treated plots than nontreated plots. The remaining seeded entries were negligent to absent. There was a substantial increase in the density of desert alyssum in the burn and no-burn treatments. At Reese Creek, there was an increase in stem counts of bluebunch wheatgrass and Sandberg bluegrass in the nontreated and treated plots. No plants were present of the remaining seeded entries. There was a substantial increase in the density of desert alyssum and the percentage canopy cover of crested wheatgrass inside the burn treatment. The study plots will again be evaluated in 2014.

Seeding the comparative evaluation planting at the Cinnabar site in Yellowston National Park

Development of plant materials for revegetation of disturbed areas related to Federal Land Highway Program projects.

Introduction. The agreements facilitate the collection, increase, and reestablishment of indigenous plant materials for restoration of disturbances resulting from road construction and other improvement projects within park boundaries. The Bridger Plant Materials Center (BPMC) has maintained cooperative agreements with Yellowstone National Park (YNP) since FY 1986. In 2013, 10 allocations of 91 seed lots were distributed to Yellowstone National Park or the BPMC (used to plant seed increase fields). The distribution included 68 grass lots (16 species), 22 forb lots (11 species), and 1 shrub lot.

Accomplishments. Yellowstone National Park can forecast future road construction projects with enough lead time to allow seed and/or plant collection and production efforts to begin three years in advance of each project. Wildland seed collections are made by Yellowstone National Park and BPMC crews, dried, and either delivered to the BPMC or picked up by BPMC personnel. In 2013, 52 wildland collections produced a total of 32 pounds of seed, including 27 pounds from 30 grasses (15 species), 4.4 pounds from 21 forbs (15 species), and 0.22 pounds from a shrub.

In 2013, seed increase fields of seven grass accessions (six species) were harvested at the BPMC on 1.6 acres, resulting in more than 137 pounds of seed produced. Seed increase blocks of four grasses on 0.87 acre were removed due to natural decline in production. Three new seed increase fields (1 acre) were planted on August 23. Currently, there are 2.1 acres of six grass accessions (five species) planted to seed increase blocks at the BPMC. The wildland seed and increase inventory contains seed dated from 2004 to 2013. The 2008 seed lots of slender wheatgrass and the 2006 seed lots of mountain brome were returned to Yellowstone National Park in 2013. Additionally, all seed lots from 2003 were distributed back to the park.

Technology Development. All plant materials collections are assigned accession numbers and inventoried in a database. The lot identification numbers have been upgraded to include identification by individual construction projects.

2013 Yellowstone National Park seed increase at the Bridger PMC

Species	Accession	Lot Number	Field Size acre	Harvest Date	Bulk Amount (lbs)	% Pure Live Seed	Test Date
Bromus marginatus	9088025	SCO-13-YNP-140	0.14	7/02	11.0	85.83	2/21/14
Elymus trachycaulus	9081525/526	SCO-13-YNP-41	0.26	7/14	108.0	97.82	10/15/13
Leymus cinereus	9081887	SCO-13-YNP-45	0.33	7/31 & 8/01	16.0	92.71	2/26/14
No tests were conducted on the following small seed lots:							
Festuca idahoensis	9081537	SCO-13-YNP-86	0.33	7/02	0.78	—	—
Festuca idahoensis	9081882	SCO-13-YNP-143	0.33	7/02	0.36	—	—
Pseudoroegneria spicata	9081759	SCO-13-YNP-140	0.14	7/12	0.84	—	—

Seed production field of Yellowstone National Park's basin wildrye (*Leymus cinereus*) at Bridger PMC

Seed harvest of Yellowstone National Park's mountain brome (*Bromus marginatus*) at Bridger PMC

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. This report covers activities that have been conducted by Upper Colorado Environmental Plant Center (UCEPC) for Yellowstone National Park through an Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order P12PD12993. The Task Order calls for UCEPC to produce seed for a single grass species, bluebunch wheatgrass. UCEPC is to produce approximately 240 pounds pure live seed (pls) for Yellowstone from a 1 acre field. This agreement will remain in effect until April 30, 2016.

Accomplishments. Plant vigor and seed yield were good for most products including Yellowstone bluebunch. The field is filling in better where the blank spots were reseeded in 2012, but there was no seed yield from those newly planted sections. From the existing portion of the field, 118 pounds of clean seed were harvested on July 8, 2013.

A seed shipment was sent to Yellowstone National Park on September 18, 2013, for some revegetation work. The total seed production from years 2011 and 2012 was sent; 132 bulk pounds constituting 62.34 pls pounds. The only seed on inventory is the seed produced in 2013.

Species	Year	Date Planted	Acreage	Harvest Date	Bulk Amount (lbs)	% Pure Live Seed	Test Date
Bluebunch wheatgrass	2010	August 18	1.0	NA			
	2011		1.0	7/19/11	10	5.79	1/16/12
	2012	November 5	1.0 (blanks)	6/26/12	122	56.55	1/22/13
	2013		1.0	7/8/13	118	80.63	3/7/14

Technology Development. Standard planting, cultural practices, harvest, and cleaning protocols have been used to produce bluebunch wheatgrass.

Yellowstone National Park bluebunch wheatgrass

Zion National Park, Utah

Prepared by: **Los Lunas, New Mexico, USDA NRCS Plant Materials Center**

Introduction. In June 2009, an agreement was made between the USDA-NRCS Los Lunas Plant Materials Center (LLPMC) and Zion National Park (ZNP) to propagate 800 pure live seed (PLS) pounds of bottlebrush squirreltail (*Elymus elymoides*) and 200 PLS/lbs of Indian ricegrass (*Achnatherum hyvmenoides*).

The agreement states that Zion National Park will use this seed to revegetate disturbed areas in the park. The seed of these two species was collected by the park staff and sent to the LLPMC for conditioning. After conditioning, the seed was used to establish seed production fields according to the agreement.

Accomplishments. We used a new technique to harvest the ZNP bottlebrush squirreltail in 2013; a Trac-Vac harvester was modified so it could be attached to a tractor (see the following photograph). This allowed us to harvest a greater amount of seed from the production field than in previous years. By using the Trac-Vac harvester, the amount of bulk material harvested doubled, and the amount of cleaned seed weight almost tripled compared to using a flail-vac harvester or combine harvesting methods in 2012.

Harvesting Zion National Park bottlebrush squirreltail with a Trac-Vac harvester attached to a tractor

See the following tables for the established species at the LLPMC, the amount of seed produced in 2013 and the amount of pure live seed on inventory for Zion National Park:

Zion National Park Accessions:

Common Name	Scientific Name	Agreement Acreage	2013 Acreage
bottlebrush squirreltail	*Elymus elymoides*	1.50	1.00
Indian ricegrass	*Achnatherum hymenoides*	0.50	0.42*

* Only 0.42 acre of Indian ricegrass was established due to the amount of seed originally received from Zion National Park

2013 Zion National Park Seed Production at the Los Lunas PMC:

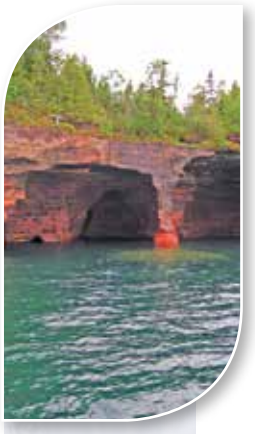
Common Name	Scientific Name	Pounds Cleaned (Bulk)
bottlebrush squirreltail	*Elymus elymoides*	210.00
Indian ricegrass	*Achnatherum hymenoides*	32.5

Zion National Park Pure Live Seed on Inventory at the Los Lunas PMC remains unchanged from 2012, please refer to the 2012 annual summary report.

Zion National Park bottlebrush squirreltail seed production Field 19

This agreement expired in 2013. The LLPMC has removed the seed production fields of bottlebrush squirreltail and Indian ricegrass. The Zion National Park seed (see the previous table) will be stored at the LLPMC until the park submits a request for seed.

MIDWEST REGION



Apostle Islands National Lakeshore, Wisconsin

Prepared by: **East Lansing, Michigan, USDA NRCS Plant Materials Center**

Introduction. The Apostle Islands National Lakeshore entered into an interagency agreement with the Natural Resources Conservation Service to propagate plants of beachgrass (*Ammophila breviligulata*) AMBR, crinkled hairgrass (*Deschampsia flexuosa*) DEFL, Canada mayflower (*Maianthemum canadense*) MACA4, juniper (*Juniperus communis*) JUCO6, evening primrose (*Oenothera oakesiana*) OEOA, and common milkweed (*Asclepias syriaca*) ASSY. During the summer and autumn of 2011 NPS staff collected seeds or vegetation material from each species and sent them to the Rose Lake Plant Materials Center. The PMC developed propagation protocols, propagated each species and delivered those plants to the park service as agreed upon in the Interagency Agreement.

Accomplishments. In 2012, 16,330 plants were propagated and delivered to Apostle Islands National Lakeshore, please refer to the 2012 summary report for a detailed inventory.

Technology Development. The Rose Lake Plant Materials Center has worked with Apostle Islands National Lakeshore since 2000 to develop propagation protocols for 30 plant species that are native to the park.

Rose Lake PMC has tried many stratification and scarification treatments on common juniper seed to hasten germination and facilitate establishment. As individual treatments and as treatment combinations, cold stratification, warm stratification, acid treatments, and physical abrasion have not proven effective in improving germination and emergence. Heretofore, the best propagation method has been to plant seeds in the spring of "Year 1," allow the seeds to overwinter into "Year 2," and wait for germination to occur in the spring of "Year 2."

A trial was designed to evaluate the effect that separating juniper seed has on germination. These treatments were imposed:

1. Whole berries without stratification.
2. Seeds without stratification but separated by soaking berries for 48 hours in a dilute lye solution (1 tsp/gal water), rinsing, and rubbing on a metal screen. Seed and pulp were soaked in water for 8 hours allowing the viable seed to sink to the bottom and the nonviable seed and pulp to float. Viable seeds were air dried.
3. Whole berries with stratification treatment consisting of placing seeds into a cloth bag, moistening, and placing in a zip lock bag containing moist peat for 16 weeks.
4. Seeds separated as in treatment (2) above and stratified as in treatment (3) above.

All treatments were refrigerated for 16 weeks. On April 30, 2012, seeds and berries were planted in peat-based potting mixture in 5-inch yellow Cone-tainers™ in the greenhouse. There were approximately 98 berries (Treatments 1 and 3) or 98 seeds (Treatments 2 and 4) per treatment. (A berry contains 1 to 3 seeds.) Experimental design was completely randomized with three replicates.

No emergence was observed during 2012. Cone-tainers™ were kept outdoors and protected through the winter of 2012–13. Cone-tainer™ were brought into the greenhouse in late March 2013. The table below shows emergence data as observed and recorded on April 19, 2013, and May 7, 2013, and subjected to analysis of variance. In all cases, separated seeds exhibited significantly higher emergence rates than whole berries.

Emergence of common juniper seed subjected to various treatments

Treatment	% Emergence	
	April 19, 2013	May 7, 2013
1. whole berries; no stratification	1a	5a
2. seeds; lye	26b	25b
3. whole berries; stratification	3a	3a
4. seeds; stratification	26b	32b

Within columns, means followed by the same letter are not significantly different as determined by LSD at P≤0.05

Common juniper seedlings

Badlands National Park, South Dakota

Prepared by: **Bismarck, North Dakota, USDA NRCS Plant Materials Center**

Introduction. The National Park Service has a need to preserve the native plant resources and revegetate disturbed park lands. The National Park Service requires native plants restoration to be accomplished using germplasm from populations as closely related genetically and ecologically as possible to the park populations. Quantities of native seed are needed to revegetate areas disturbed by construction activities for the proposed road rehabilitation project. The National Park Service has requested assistance from the Bismarck Plant Materials Center (PMC). The PMC has agreed to increase seed of five selected grass species collected at Badlands National Park. Technical assistance for planting, growing, and cleaning of seed will also be provided to the park. The original interagency agreement was signed in May 2007 and expired in 2010. The agreement was amended extending the contract for 2011. A new agreement was signed for 2012 and 2013. The agreement has expired and fields will be removed in the summer of 2014. All seed produced will be distributed to the park in 2014.

Targeted species and goaled amounts for contract period 2007–13

Species	Common Name	PLS Pounds
Nassella viridula	green needlegrass	300
Pascopyrum smithii	western wheatgrass	600
Bouteloua gracilis	blue grama	50
Sporobolus cryptandrus	sand dropseed	25
Elymus trachycaulus	Slender wheatgrass	100

Accomplishments. Slender wheatgrass seed production goals were met prior to 2012 and the field was removed in 2012. Green needlegrass and western wheatgrass fields remained unchanged in size and location. In 2012, the blue grama field was increased from 0.04 acre to 0.3 acre and the sand dropseed field was increased from 0.03 acre to 0.10 acre using seed from prior years PMC field harvests. Seed was harvested from all fields in 2013. All seed was harvested by straight combining except the western wheatgrass, which was swathed and combined. The 2012 field extension of blue grama established very well. The field increase of sand dropseed was slower to establish and was mowed to remove annual weeds in the field. Seed was cleaned at the PMC and tested for purity and germination by the North Dakota State Seed Department. There was no seed distributed in 2013 to Badlands National Park.

Seed Production and Distribution

Access-ion Number	Species	Date Planted	Field Size (ac)	2013 Seed Production (PLS lbs)	2013 Seed Harvest Date	Seed Distribution to Park in 2013 (PLS lbs)	Inventory Remaining as of 3/17/2013 (PLS lbs)
9092167	Green needlegrass	11/30/07	0.41	68	7/11/13	0	459
9092165	Western wheatgrass	05/06/08	1.50	54	8/1/13	0	164
9092166	Slender wheatgrass	05/06/08	field removed	field removed	field removed	0	568
9092168	Blue grama	06/10/08	0.30	98	8/20/13	0	126
9092169	Sand dropseed	05/22/08	0.10	10	7/30/13	0	32

Technology Development. Combine settings, seed cleaning procedures, and seed tests have been documented and are available from the PMC.

Badlands National Park blue grama seed production field crop in front of sign

Theodore Roosevelt National Park, North Dakota

Prepared by: **Bismarck, North Dakota, USDA NRCS Plant Materials Center**

Introduction. The Bismarck Plant Materials Center (PMC) entered into a cooperative agreement in May 2007 to provide seed and technical information needed for revegetation of areas disturbed by construction activities in the North Unit Scenic Route 10 of Theodore Roosevelt National Park in western North Dakota. The agreement is among the National Park Service, Theodore Roosevelt National Park of the US Department of the Interior, and the USDA Natural Resources Conservation Service. The original agreement was effective from FY 2007 through FY 2010. A new agreement was later signed and in effect for FY 2011 and expired in FY 2012. A new agreement was developed to extend the agreement for FY 2013. The agreement will expire on 3/15/2015. The Bismarck Plant Materials Center (PMC) originally agreed to produce native grass seed of six species collected in the park by park personnel and PMC staff. The new agreement terminates the production of slender/ thickspike wheatgrass and green needlegrass because goaled seed amounts were met.

The seed produced at the PMC will be distributed to the park for revegetation projects.

Targeted species and goaled seed amounts for contract period 2007–14

Species	Common Name	PLS Pounds
Pascopyrum smithii	western wheatgrass	550
Elymus trachycaulus	slender wheatgrass	260
Nassella viridula	green needlegrass	240
Bouteloua curtipendula	sideoats grama	220
Bouteloua gracilis	blue grama	54
Koeleria macrantha	prairie junegrass	29

Accomplishments. Four seed production fields were managed and maintained using herbicides and hand roguing for weed control. The fields were not irrigated in 2013. All fields produced seed and were harvested by straight combining. The sideoats grama field was increased from 0.03 acre to 0.3 acre in 2012. The blue grama field was increased from 0.02 acre to 0.3 acre and the prairie junegrass field was increased from 0.02 acre to 0.2 acre, also in 2012. The new fields of sideoats grama and blue grama have established well and produced a good seed crop. The prairie junegrass field established poorly and resulted in little seed harvested from the field in 2013. Seed used for establishing the new fields came from the harvest of original park fields grown at the PMC. The western wheatgrass field was maintained at 0.57 acre and also was harvested in 2013. The green needlegrass and slender/ thickspike wheatgrass fields were taken out of production in 2012 as seed goals were met. Seed was cleaned at the PMC and tested for purity and germination by the North Dakota State Seed Department. There was no seed requested or distributed to the park in 2013.

Seed Production and Distribution

Accession Number	Species	Date Planted	Field Size (ac)	2013 Seed Production (PLS lbs)	2013 Seed Harvest Date	Seed Distribution to Park in 2013 (PLS lbs)	Inventory Remaining as of 3/18/2013 (PLS lbs)
9092171	Green needlegrass	11/30/07	0.00	field removed	none	0.00	342
9092172	Western wheatgrass	05/01/08	0.57	204	7/30/13	0.00	245
9092175	Slender wheatgrass	05/01/08	0.00	field removed	none	0.00	576
9092173	Blue grama	06/10/08	0.30	135	8/20/13	0.00	178
9092174	Sideoats grama	06/10/08	0.30	146	8/17/13	0.00	197
9092176	Prairie junegrass*	05/22/08	0.20	173grams	7/29/13	0.00	9

* Original field started with 600 plants grown in the greenhouse

Technology Development. Combine settings, seed cleaning procedures, and seed tests have been documented and are available from the PMC.

Theodore Roosevelt National Park sideoats grama seed production field

Tallgrass Prairie National Preserve, Kansas

Prepared by: **Manhattan, Kansas, USDA NRCS Plant Materials Center**

Introduction. The National Park Service, in managing the Tallgrass Prairie National Preserve (TPNP), identified a need to preserve the native plant flora in conjunction with the construction of a new visitor center. The National Park Service required that the restoration of native plants to the site be accomplished using germplasm from populations as closely related genetically and ecologically as possible to park populations. In 2011, an agreement was made with the Manhattan Plant Materials Center (MPMC) to propagate plants from seed collected by NPS employees and volunteers and store the remaining seed.

Accomplishments. NPS employees and volunteers made seed collections of 20 native species found on the TPNP in 2010 and 2011. On March 16, 2012, the MPMC received the collections and began cleaning the seed. Seed units of additional species found in the collections were separated from the collections. Seed quality was poor on many of the collections, 20% of which lacked filled seed units. Seeds from the remaining collections were planted to Cone-tainers™ in the PMC greenhouse. Seedlings were obtained from 94% of the collections, but in typically small numbers of individual seedlings. The PMC succeeded in delivering 233 plants for the TPNP plantings in June 2013. There were 134 seedlings in 21 cm Cone-tainers™ and 99 seedlings in 25 cm deep pots.

Tallgrass Prairie National Preserve plant production delivered June 5, 2013.

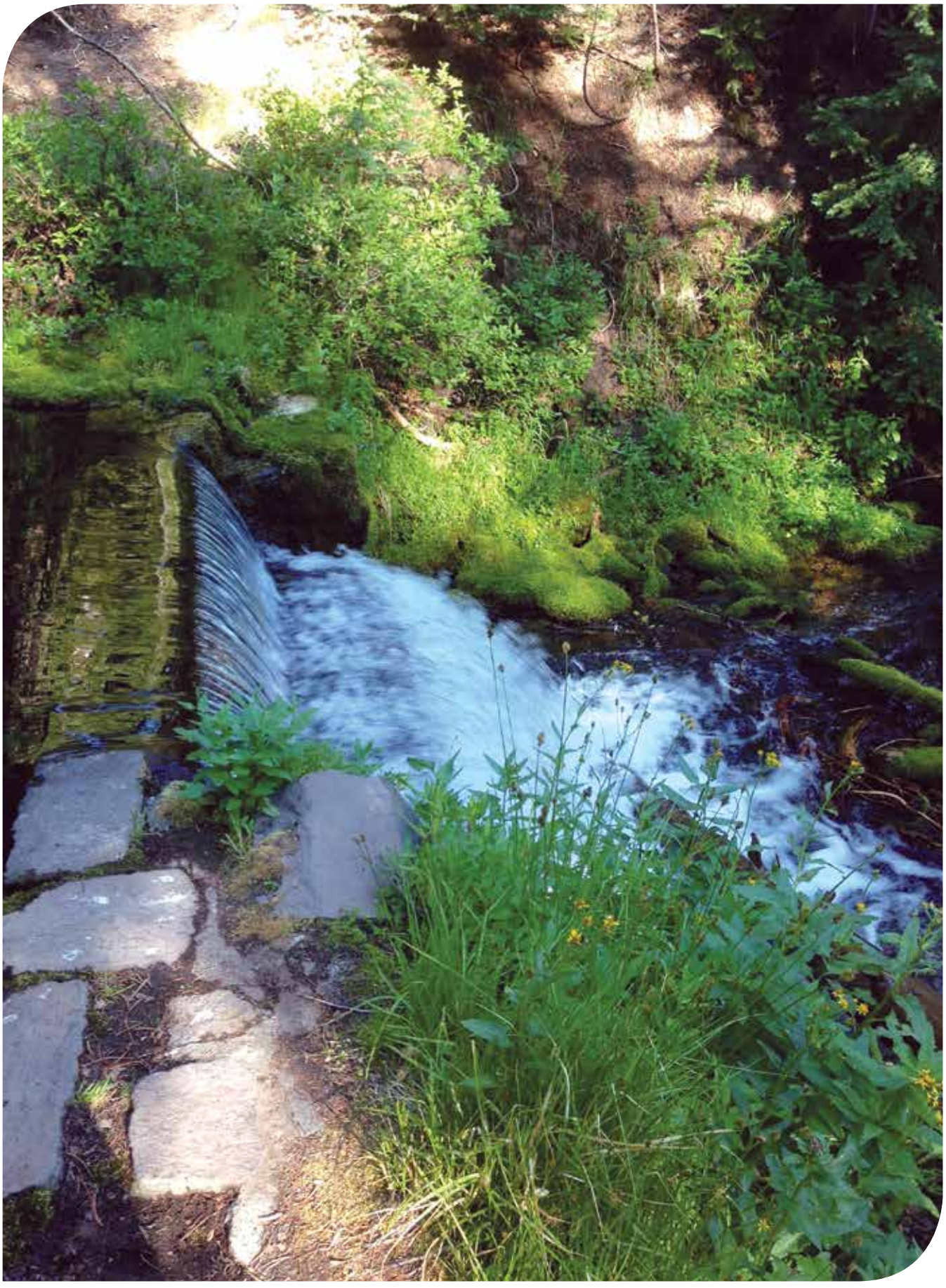
Alternate No.	Species	Common Name	No. of Plants in 21 cm Containers	No. of Plants in 25 cm Containers
NPS-KS-10-001	*Mimosa nuttallii*	catclaw sensitive brair	13	4
NPS-KS-10-002	*Penstemon cobaea*	prairie beardtongue	1	0
NPS-KS-10-004	*Asclepias syriaca*	common milkweed	13	10
NPS-KS-10-005	*Baptisia australis*	blue wild indigo	15	5
NPS-KS-10-006	*Echinacea angustifolia*	black sampson	10	0
NPS-KS-10-010	*Amorpha canescens*	lead plant	0	0
NPS-KS-11-001	*Astragalus crassicarpus*	groundplum milkvetch	0	0
NPS-KS-11-002	*Delphinium carolinianum*	prairie larkspur	0	1
NPS-KS-11-003	*Asclepias tuberosa*	butterfly milkweed	24	11
NPS-KS-11-004	*Liatris aspera*	button blazing star	6	3
NPS-KS-11-005	*Ratibida columnifera*	prairie coneflower	0	0
NPS-KS-11-006	*Ceanothus americanus*	New Jersey tea	1	0
NPS-KS-11-007	*Silphium laciniatum*	compass plant	8	5
NPS-KS-11-008	*Baptisia bracteata*	cream wild indigo	9	1
NPS-KS-11-009	*Tradescantia ohiensis*	Ohio spiderwort	0	0
NPS-KS-11-010	*Koeleria macrantha*	June grass	0	0
NPS-KS-11-011	*Dalea purpurea*	purple prairie clover	1	0
NPS-KS-11-012	*Oenothera macrocarpa*	Missouri evening primrose	2	6
NPS-KS-11-013	*Psoralidium tenuiflorum*	wild alfalfa	13	0
NPS-KS-11-014	*Lespedeza capitata*	roundhead lespedeza	11	5
NPS-KS-11-015	*Andropogon gerardii*	big bluestem	0	15
NPS-KS-11-016	*Sorghastrum nutans*	Indian grass	1	18

Alternate No.	Species	Common Name	No. of Plants in 21 cm Containers	No. of Plants in 25 cm Containers
NPS-KS-11-017	*Panicum virgatum*	switchgrass	1	13
NPS-KS-11-018	*Bouteloua curtipendula*	sideoats grama	4	1
NPS-KS-11-019	*Sporobolus cryptandrus*	sand dropseed	1	1
Total Plants provided:	134	99		

Legend: Alternant No. = Agency-State-Crop Year-Collection Number

Planting at Tallgrass Prairie National Preserve

Milkweed seedlings being produced for Tallgrass Prairie National Preserve



PACIFIC WEST REGION

Golden Gate National Recreation Area, California

Prepared by: **Corvallis, Oregon, USDA NRCS Plant Materials Center**

Introduction. In 2009, the Corvallis Plant Materials Center (PMC) entered into an agreement with Golden Gate National Park to provide native plant materials for ecological restoration following road construction in the Marin Headlands. The PMC has agreed to produce 250 pounds of two grasses.

Activities in 2013 included maintenance and harvest of two grass seed increase fields. The PMC met the contract goals for the oatgrass seed in 2012, but production in 2013 was needed to meet goals for the needlegrass. This year's harvest of oatgrass will hopefully make up for the smaller amount of needlegrass, since the needlegrass field has not been producing as much as planned.

Accomplishments. Accessions included for the restoration of Marin Headlands are listed in the following table. This table also displays activities performed by PMC staff in 2013.

Accessions for the Marin Headlands restoration project with the Corvallis Plant Materials Center in 2013.

Species	Common Name	Code	Accession	Activity in 20131
Danthonia californica	California oatgrass	DACA3	9079621	Sfp , Dlv
Nassella lepida	foothill needlegrass	NALE2	9079622	Sfp

1-Sfp= seed field production, Dlv= delivery

Seed increase activities: The Nassella field appeared vigorous this year. The field was hand-weeded many times to remove the rattail, but as the N. lepida plants grew taller and began to flower it was difficult to find the rattail. The weedy bentgrass plants were wiped with canes filled with glyphosate. The needlegrass was harvested using a flail-vac seed stripper in early July and again in late July.

The *Danthonia* field looked great again in 2013, but not as impressive as in 2011. All *Danthonia* fields on the PMC farm were not as vigorous or as tall as they were in 2011. This field seems to be maintaining fairly high yields as it approaches its fifth year. California oatgrass is a long-lived species and fields can remain productive for over 10 years. Even though the goals have been met for this project, it may be worthwhile to keep this field in production another year if there is any other planned disturbance in the park where this seed lot would be appropriate to use.

Seed yields for the Marin Headlands project with the Corvallis Plant Materials Center in 2013.

Species	Harvest Date	Harvest Method	Field size (ac)	Yield
Nassella lepida	June 16	seed stripper	0.2	10 lbs
Danthonia californica	July 3, July 25	seed stripper, swath/combine	0.5	94 lbs

Delivery and Storage: In June 2013, 100 pounds of oatgrass was shipped to the park. All remaining seed will be stored in the PMC seed storage facilities until requested by the park.

Seed in storage for the Marin Headlands project with the Corvallis Plant Materials Center in 2013.

Species	Seed Lot	Amount (lbs)
Nassella lepida	SG1-10-GG622	3.0
Nassella lepida	SG1-12-GG622	8.5
Nassella lepida	SG1-13-GG622	10.0
Danthonia californica	SG1-12-GG621	100.0
Danthonia californica	SG1-13-GG621	94.0

California oatgrass (*Danthonia californica*) seed increase field in bloom at The Corvallis Plant Materials Center

Lassen Volcanic National Park, California

Prepared by: **Corvallis, Oregon, USDA NRCS Plant Materials Center**

Introduction. The Corvallis Plant Materials Center (PMC) entered into an agreement with Lassen Volcanic National Park in 2009 to provide additional native plant materials for planting around the new visitors center and in the restoration of historically disturbed lands in the park. This agreement was extended in 2012. Activities in 2013 included plant production (by seed) of three forb, one grass, and one legume species. Approximately 1,200 plants were produced and delivered to the park this year.

Accomplishments.

Accessions involved in the Lassen Volcanic National Park agreement in 2013.

Species	Common Name	Symbol	Accession Number	Activity in 20131
Lupinus obtusilobus	bluntlobe lupine	LUOB	9079501	Pxn, Dlv
Silene sp.	catchfly	SILEN	9079637	Pxn, Dlv
Senecio aronicoides	rayless ragwort	SEAR4	9079640	Pxn, Dlv
Calamagrostis canadensis	bluejoint	CACA4	9109082	Pxn, Dlv
Achillea millefolium	common yarrow	ACMI2	9109203	Pxn, Dlv

1-pxn=produced plants, dlv=delivered plant materials

Plant Propagation Activities: All species were sown from seed in early May into racks of Ray Leach "stubby" Cone-tainers™ filled with moistened media (Sunshine #4 mix amended with a balanced slow-release fertilizer and micronutrients). Flats were placed outside in a shadehouse (average daily temp is about 65°F). Plants were watered and fertilized overhead as needed. Two weeks before delivery plants were slowly exposed to direct sunlight to acclimate them.

All plants grew well in the shade house all summer. The grasses were trimmed to 2 inches prior to delivery. This makes stacking and handling the racks of Cone-tainers™ easier and can help reduce water stress after transplanting.

Delivery and Storage: On September 21, 2013, PMC staff traveled to the park to deliver the plants.

Plants delivered to Lassen Volcanic National Park, September 21, 2013, for the visitor center agreement

Species	Accession Number	Number of Plants
Lupinus obtusilobus	9079501	15
Silene sp.	9079637	9
Senecio aronicoides	9079640	98
Calamagrostis canadensis	9109082	1035
Achillea millefolium	9109203	48

Ragwort (*Senecio* sp.) Plants Growing at The Corvallis Plant Materials Center

Prepared by: **Meeker, Colorado, Upper Colorado Environmental Plant Center**

Introduction. An Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract between Lassen Volcanic National Park (LAVO) and Upper Colorado Environmental Plant Center (UCEPC) was generated in 2012. LAVO-53237, Base ID/IQ Contract AG-8B05-C-12-0002, Task Order P12PD11296, identified in the scope of work that UCEPC would establish a seed production field of western needlegrass (*Achnatherum occidentalis*). The seed source was provided by LAVO staff from collections made within the park. The agreement targeted a quantity of 30 pounds pure live seed (PLS). This task order remains in effect until December 31, 2014.

Accomplishments 2010. The first shipment of *Achnatherum occidentalis* received by UCEPC was 402 grams. Germination tests were conducted on the 2009 and 2010 lots; the average viability was 15%. Both parties agreed that efforts to recollect seed were necessary before planting the 0.33-acre field. Unfortunately, due to time and funding restrictions no additional seed was collected.

2011

On August 12, 10 rows were hand-planted using a Planet Jr. Seeder and a seeding rate of 60 seeds per linear foot of row. By mid-September, the field had excellent germination and photographs were taken. Unfortunately, Colorado experienced an open winter with little to no snow. The bare soil conditions and strong winds caused drifting, which destroyed nearly all the newly established plants. From the 2010 germination trials, 12 plants had survived and were maintained in the greenhouse. These were transplanted in the field in August as well where they continued to thrive and produce seed. The severe winter did not affect these plants.

2012

With only small amounts of seed remaining, UCEPC chose to start plugs of needlegrass in the greenhouse to supplement the field. On May 24, 2012, 4,000 needlegrass plugs were seeded using the original collection. Only 1,600 germinated. The needlegrass plugs remained in the greenhouse until the following spring to avoid the possibility of another loss due to harsh winter weather. Jay Johnson and Martin Hutten of Lassen Volcanic National Park made a third collection of needlegrass in July 2012. There were 170 grams of seed cleaned by UCEPC staff. The field was replanted October 5, 2012, using 152 grams of this native seed. Irrigation was applied immediately to the field after the inter-seeding and repeated as necessary through the fall.

2013

On August 12, 1,000 plugs were planted by hand into the existing field. A 1-inch diameter space bar was used to punch holes 1 foot apart. The holes were filled with water, needlegrass plugs inserted, backfilled with soil and tamped lightly. The remaining 22 grams of seed from the 2012 collection was used to inter-seed the remainder of one row. Furrow irrigation was applied after planting and repeated every 10 to 15 days as needed. A hand harvest was made on July 6, 2013, and produced 34 grams of cleaned seed. Standard maintenance protocol was applied to the Lassen needlegrass field.

Lassen Volcanic National Park 2013 *Achnatherum occidentalis*

Sequoia and Kings Canyon National Parks, California

Prepared by: **Lockeford, California, USDA NRCS Plant Materials Center**

Introduction. In 2011, the Lockeford California Plant Materials Center (PMC) entered into an agreement with Sequoia and Kings Canyon National Parks (SEKI) to produce seed of two grasses, California brome (*Bromus carinatus*), and blue wild rye (*Elymus glaucus*) and one forb species, miniature lupine (*Lupinus bicolor*). Under the contract, there is a specification for delivery of 12 lbs of seed for both grass species and 10 lbs for the miniature lupine, delivered over the period of the contract. In addition, seed of six additional species was delivered for cleaning and storage. The agreement will run through 2014.

The National Park Service requires that restoration of native plants be accomplished using germplasm from populations as closely related genetically and ecologically as possible to park populations. The PMC was chosen due to its ability to clean, propagate, and produce the desired amounts of high-quality seed within the required time frame. The PMC is also able to conduct studies to determine adaptation and cultural requirements for establishment and seed production.

Accomplishments. California brome, blue wildrye, and miniature lupine planted during the fall of 2011 were harvested in 2012 and 2013. Seed of all three species were provided by Sequoia and Kings Canyon National Parks and cleaned at the PMC. Miniature lupine was planted using weed mat, but this blew away during a winter storm. Seed was hand harvested and then plants were cut using a sicklebar mower and spread on tarps for seed release. California brome and blue wildrye were harvested with a Flailvac, which allowed more than one harvest. The amounts of harvested seed obtained after cleaning during 2012 and 2013 is shown in the following table.

Seed of miniature lupine, 0.1 acre was planted in fall 2012 from seed harvested in 2012 using weed mat established on 0.1 acre and irrigated during a dry fall with sprinkler irrigation. Seed germination was good through the weed mat. Seeds were pre-treated with fungicide prior to planting as fungal diseases have killed previous lupine plantings into weed mat at the PMC.

Additional seed lots of 12 species were cleaned at the PMC during 2013 and are being maintained in storage.

Seed harvested under contract to Sequoia-Kings Canyon National Parks during 2012 and 2013

Code	Common Name	Area (acres)	Seed bulk (lb)	PLS (lb)	Date tested*	Seed bulk (lb)	PLS (lb)	Date tested
Year			2012				2013	
BRCAC8	California brome	0.25	11.00			6.0	5.64	4/13/14
ELGLG	Blue wildrye	0.25	4.25			2.5	2.0	4/13/14
LUBI	Miniature lupine	0.25	8.00			5.3		

*Seed of 2012 collected seed was tested for PLS last year. There were some issues with the seed testing company and they are to be re-tested.

Rows of California brome in May, seed heads are growing, but still immature

Shawn Vue, seed technician, cleaning seed ofSequoia-Kings Canyon National Parks California brome

Yosemite National Park, California

Prepared by: **Lockeford, California, Plant Materials Center**

Introduction. In 2013, the Lockeford California Plant Materials Center (PMC) entered into an agreement with Yosemite National Park (YOSE) to produce seed of western needlegrass (*Achnatherum occidentale*) for restoration of native vegetation along Tioga Pass. Under the original contract, there was a specification for planting 1 acre for seed production. This needed to be amended because there was insufficient seed and a low rate of germination precluding plug plant production.

The contract was amended for the production of a propagation protocol for western needlegrass, and seed production of two additional species—blue wildrye (*Elymus glaucus*) and naked buckwheat *(Eriogonum nudum)* with seed provided by YOSE. Seed of these species will be harvested and the agreement will run through 2015.

The National Park Service requires that restoration of native plants be accomplished using germplasm from populations as closely related genetically and ecologically as possible to park populations. The PMC was chosen due to its ability to clean, propagate, and produce the desired amounts of high-quality seed within the required time frame. The PMC is also able to conduct studies to determine adaptation and cultural requirements for establishment and seed production.

Accomplishments. *Achnatherum occidentale* seed (99 g) collected by the National Park Service in 2013 was provided to the CAPMC. In addition, the PMC had additional seed of *A. occidentale* collected at Yosemite in 2012 and stored at the PMC. Both of these seed lots were used for germination studies and kept separate during trials. The first planting sowed seed into flats of sunshine mix #4 had approximately 1% germination in both old and new seed lots.

The first strategy investigated several treatments with cold stratification and freezing for limited times. Seeds were then cold stratified at two temperatures. One flat was held at approximately 40°F for four weeks and another was frozen at about 10°F for four weeks. Seeds began to germinate about two weeks after removal from cold when placed in a germination chamber held at 65°F. The cooler treatment did not affect germination, but the freeze treatment increased germination to about 3%–4%.

A second more successful treatment strategy was performed using a form of electrolyzed water called neutral anolyte, which has a near neutral pH and free chlorine ions that sanitize the seed. This anolyte was 500 ppm and was diluted into three treatment groups. A control of distilled water was used, then 500 ppm anolyte, 250 ppm anolyte diluted with distilled water, and 125 ppm anolyte diluted with distilled water. Seed from 2012 and 2013 lots were treated in separate groups to determine if seed age or dormancy is playing a role in low germination rates. The seeds were soaked in the neutral anolyte for approximately 45 minutes then removed using filter paper and allowed to dry for 2 hours. The seeds were then soaked in Catholyte solution, which is alkaline water with surfactant properties that cleanses the seed and provides antioxidants to soften the seed coat and imbibe the seed with water. Seeds were soaked overnight for approximately 16 hours. After two weeks, the highest germination rate (15%) was in the 2012 seed treated with 250 ppm anolyte solution.

The final treatment was a smoke water treatment—a literature survey indicated that this could substantially increase germination. Many species are fire-adapted and thus have a mechanism triggered by a chemical produced by the burning of vegetation. Smoke water was produced by burning leaves of oak and sucking the smoke through a shop vac and blowing it into a large bucket of water to bubble it through for about 45 minutes. This water was then used to soak 2012 and 2013 seeds separately for 2 hours. The highest germination rate with a smoke water treatment was 16%.

Initial germination of *Achnatherum occidentale* seedlings

Lab studies with the electrolyzed water treatments

Seed of blue wildrye (*Elymus glaucus*) provided by Yosemite was planted in December 2013 by direct seeding 0.25 acre. These plants germinated well under sprinkler irrigation and are growing well. An additional five flats were planted in the greenhouse in case the direct seeding failed, these were to be transplanted next to the direct seeded plants.

Prepared by: **Meeker, Colorado, Environmental Plant Center**

Introduction. Yosemite National Park (YOSE) awarded Upper Colorado Environmental Plant Center (UCEPC) with the Indefinite Delivery/Indefinite Quantity (ID/IQ) Contract AG-8B05-C-12-0002, Task Order P13PD00746 on July 24, 2013. The project, Rehabilitate Disturbed Areas Along Tioga Road Phase I, requires revegetation with native plant seed of Yosemite genetic origin. The task order identifies UCEPC to propagate, establish, and maximize seed production from two 0.5-acre fields of native grass (*Bromus carinatus*) and (*Elymus elymoides*). The seed source would be provided by collections made from park staff. This contract shall remain in effect until August 31, 2015.

Accomplishment. UCEPC received two seed collections from Yosemite on April 2, 2013—276 grams of clean *Bromus carinatus* and three bags of unclean *Elymus elymoides*. UCEPC staff cleaned the *Elymus elymoides* to provide 352 grams. With only a small amount of brome seed to work with, an in-house germination test was conducted to determine viability. Results concluded only 56% viability of the brome seed. The decision was made then to propagate plugs in the greenhouse for establishing the 0.5-acre field. On April 19 and 22, UCEPC staff finalized planting 8,023 cells at a planting rate of two seeds per cell. Only 20% of the brome seed germinated. An additional tray was planted on May 17 for a comparison trial, but the results remained the same. On July 26, staff transplanted 1,640 brome plugs into 4.5 rows. The remainder of the half row and three additional rows were direct seeded using all the seed that was left from this collection. A Planet Junior Seeder was utilized for planting the brome and set at 30 seeds per linear foot a row. Furrow irrigation was applied immediately after and repeated every 10 to 15 days as needed.

In addition to the brome field, UCEPC staff planted 11 rows of *Elymus elymoides*. On August 1, 2013, the bottlebrush field was established using a Planet Junior Seeder set to plant 30 seeds per linear foot a row. All 352 grams of seed from this collection were used. Irrigation was applied by overhead sprinklers and repeated as needed. An additional collection of bottlebrush seed was made by Yosemite staff in July and August. It was shipped to UCEPC on October 9. UCEPC will use the 441 grams of seed to increase the bottlebrush field to 0.5 acre in 2014. Standard planting, cultural practices, and seed cleaning protocol have been used to establish the California brome and bottlebrush squirreltail fields.

2012 Yosemite National Park collection of *Bromus carinatus*

NORTHEAST REGION

Gateway National Recreation Area

Prepared by: **Cape May, New Jersey Plant Materials Center**

Introduction. In late October 2012, the coastline of Gateway NRA, which encompasses the Sandy Hook unit (New Jersey) and two units (Miller Field, Great Kills Park) on the southern side of Staten Island, New York, were dramatically affected by Hurricane Sandy. The natural ecosystems and some infrastructure were heavily damaged by the storm. In response to this need, the National Park Service regional office in Boston contacted USDA-NRCS headquarters to request assistance at the Cape May Plant Materials Center with providing plant materials for revegetating the damaged dunes and shorelines. The NRCS Cape May Plant Materials Center (PMC) and the National Park Service Gateway National Recreation Area (GNRA) have a nearly 25-year relationship centered on plant materials for the restoration of dunes, marshes, and natural areas in the various park units. In addition, the center has maintained some of the Gateway NPS germplasm of coastal plant materials in seed storage since the inception of this cooperative working relationship.

However, the most immediate need was to provide American beachgrass (*Ammophila breviligulata*) for initial stabilization of the dunes. We established a new, larger beachgrass production field from a small block of plants we had collected the previous year from the Plumb Beach unit within the park.

This contract provides for production of Gateway Germplasm, primarily of American beachgrass, and two coastal shrubs—bayberry (*Morella pensylvanica*) and beachplum (*Prunus maritima*). The project is anticipated to run through 2015.

Accomplishments. An Interagency agreement with NPS-Gateway NRA was signed in July 2013 to provide up to 280,000 dormant bare root stems of American beachgrass and 1,500 bare root and/or containerized shrubs within the next two years. In addition, wild collections of targeted coastal plant materials and technical assistance through FY 2015 (September 2015) will be accomplished. The following table shows the plants distributed in 2013.

Plant quantities produced in 2013 (year one of the project)

Common Name	Scientific Name	Plant Quantity	Date Provided	Plant Form
Am. Beachgrass	*Ammophila breviligulata*	8,400	11/07/2013	Dormant bare root
Am. Beachgrass	*Ammophila breviligulata*	6,800	11/12/2013	Dormant bare root
TOTAL		**15,200**		

Future plans are to provide the grower industry with appropriate germplasm to be used to grow coastal plant materials for long-term needs within the park.

Technology Development. The most immediate need of the park was to have local genetic material of coastal plants for stabilizing dune systems. However, the Cape May Plant Center will also be developing new seeding technology for adding plant diversity to the dunes within the park. Specifically, Gateway is interested in providing more pollinator habitat on the dune systems by adding additional forbs and legumes to the dune plantings. This will require using seed lots in cold storage as well as making additional wild collections of targeted species.

Some additional technologies include:

1. Comparing the variability of beachgrass genetics within the park (Sandy Hook vs. Plumb Beach) and the commercially available and widely planted Cape variety.

2. Determining the viability of Gateway NPS seed that has been held in cold storage for up to 25 years.

One of the targeted planting areas in Miller Field on Staten Island

Woody bed shrub production at Cape May PMC

New walkway fencing installed at Miller Field Beach Site to provide beach access while protecting the newly planted beachgrass, bayberry, and beach plum

SOUTHEAST REGION

Great Smoky Mountains National Park, Tennessee

Prepared by: **Beltsville, Maryland, Norman A. Berg National Plant Materials Center**

Introduction. The current Interagency Agreement between Great Smoky Mountains National Park (GRSM) and the Norman A. Berg National Plant Materials Center (NPMC), signed in March 2010, for fiscal years 2011–15 is funded annually. GRSM and Foothills Parkway (FHP) need to preserve their native plant resources and revegetate park lands. The National Park Service requires that restoration of native plants use germplasm from populations as closely genetically related as possible to park populations. GRSM has harvested seed from native populations, but does not have the personnel, expertise, facilities, or equipment to clean, process, test, and store this seed. The NPMC has the personnel and equipment required to clean, process, and store seed sufficient to meet NPS needs. The NPMC provides necessary technical expertise to achieve this goal. Seed will be harvested and cleaned through fiscal year 2014 and by mid-April 2015, distribute all remaining seed to the park.

Accomplishments. Seed Cleaning. This is the third report for the 2011–15 contract periods. The Cades Cove increase fields and FHP harvest resulted in over 618 pounds of bulk grass, legumes, and wildflowers. The table below lists the 12 different seed lots. Due to unforeseeable circumstances, hiring additional seasonal staff was not possible and fully cleaning seed was not possible. The debearded seed (conserving space) was stored in medium-term storage in order to retain viability—cleaning will take place in 2014. We received permission to combine the 2013 and 2014 seed, saving considerable time and effort.

2013 Seed harvest and cleaned amounts listed by common name, with NPS source

Common Name	Species Code	Harvest Year	Bulk Amount (lbs)	Source
Cades Cove Increase Fields				
1. big bluestem	ANGE	2013	180.2	Cades Cove
2. bushy bluestem	ELVI3	2013	8.3	Cades Cove
3. common sneezeweed	HEAU	2013	0.7	Cades Cove
4. swamp sunflower	HEAN2	2013	119.3	Cades Cove
5. roundheaded lespedeza	LECA8	2013	7.7	Cades Cove
6. wild bergamot	MOFI	2013	31.2	Cades Cove
7. wild quinine	PAIN3	2013	7.6	Cades Cove
8. clustered mountainmint	PYMU	2013	26.1	Cades Cove
9. beardgrass	SAGI	2013	3.0	Cades Cove
10. little bluestem	SCSC	2013	33.4	Cades Cove
11. Maryland senna	SEMA11	2013	14.3	Cades Cove
12. indiangrass	SONU2	2013	286.9	Cades Cove
Total:			**618.8**	

Distribution. The NPMC distributed six different shipments of seed totaling 251 pounds (PLS) in 2013. Some uses for this cleaned seed included: plug production for the Cades Cove increase fields and revegetation of FHP sites. The following figure shows the seed harvest, distribution, and storage trends over the last three years.

2011–2013 Seed Harvested, Distributed, and Stored.

Wildrye Complex Seed / Increase Field Efforts and Results by the NPMC

Background. An amendment to the interagency agreement started in 2010. The NPMC staff planted an approximately 0.4-acre field in the spring (April–May) 2010, 11,000 plugs were propagated, grown, and field planted.

Establishment. The summers of 2010, 2011, and 2012 experienced inclement weather (low precipitation and heat), which caused many of the plugs to fail in 2010 and limited seed production and therefore harvest in 2011 and 2012. In the winter and spring of 2010–11, an additional 7,000 plugs were propagated, grown, and planted.

Field Maintenance. The field has received 50 lbs /acre of nitrogen yearly and maintained with applications of pre-emergent herbicide in the spring and late summer, as well as mowing and hand hoeing when necessary to limit weed competition.

Identification of Wildrye. The NPMC has been working on species wildrye (Virginia, southeastern, and early) in 2008 the Virginia wildrye was taxonomically split into various species with two new species identified. In the winter of 2012, samples were identified as Virginia wildrye, Southeastern wildrye and Riparian wildrye. This varying species of wildrye requires varying moisture conditions for optimal growth and seed production, which affects the amount of harvested seed.

Harvest.

- 2011 – 10 lbs PLS harvested from NPMC Increase fields—this is an establishment year for the plants and a small harvest was expected.
- 2012 – 14.4 lbs PLS of wildrye from NPMC Increase Fields – 3.6 lbs PLS from the Cades Cove increase field.

The increase fields were installed and initiated according to standard establishment protocol; however, the seed production is well below expected amounts due to drought followed by greater than normal moisture, and three different species of wildrye.

- 2013 – The NPMC increase fields are lodged potentially due to a high rainfall year. This affected the 5.4 lbs harvested.

ABOUT THIS DOCUMENT

Visit the Plant Materials Program Web site (http://Plant-Materials.nrcs.usda.gov) and the PLANTS website (http://plants.usda.gov).

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APPENDIX

Plant Materials Centers				
Palmer, AK	Alaska PMC	5310 South Bodenburg Spur Road	Palmer, AK 99645	907.745.4469
Tuscon, AZ	Tuscon PMC	3241 North Romero Road	Tuscon, AZ 85705	520.292.2999
Booneville, AR	Booneville PMC	6883 S. State Highway 23	Booneville, AR 72927	479.675.5182
Lockeford, CA	Lockeford PMC	PO Box 68, 21001 N. Elliot Road	Lockeford, CA 95237	209.727.5319
Meeker, CO	Upper CO Environmental Plant Center	5538 RBC #4	Meeker, CO 81641	970.878.5003
Brooksville, FL	Brooksville PMC	14119 Broad Street	Brooksville, FL 34601	352.796.9600
Americus, GA	Jimmy Carter PMC	295 Morris Drive	Americus, GA 31709	229.924.4499
Hoolehua, HI	Hoolehua PMC	PO Box 236	Hoolehua, HI 96729	808.567.6885
Aberdeen, ID	Aberdeen PMC	PO Box 296, 1691A South 2700 West	Aberdeen, ID 83210	208.397.4133
Manhattan, KS	Manhattan PMC	3800 S. 20th Street	Manhattan, KS 66502	785.539.8761
Galliano, LA	Golden Meadows PMC	438 Airport Road	Galliano, LA 70354	985.475.5280
Beltsville, MD	National PMC	Building 509, BARC-East, E. Beaver Dam Road	Beltsville, MD 20705	301.504.8175
East Lansing, MI	Rose Lake PMC	7472 Stoll Road	East Lansing, MI 48823	517.641.6300
Coffeeville, MS	Jamie L. Whitten PMC	2533 County Road 65	Coffeeville, MS 38922	662.675.2588
Elsberry, MO	Elsberry PMC	2803 N. Highway 79	Elsberry, MO 63343	573.898.2012
Bridger, MT	Bridger PMC	98 South River Road	Bridger, MT 59014	406.662.3579
Cape May, NJ	Cape May PMC	1536 Route 9 North	Cape May Court House, NJ 08210	609.465.5901
Los Lunas, NM	Los Lunas PMC	1036 Miller Street, SW	Los Lunas, NM 87031	505.865.4684
Big Flats, NY	Big Flats PMC	3266A State Route 352	Corning, NY 14830	607.562.8404
Bismarck, ND	Bismarck PMC	3308 University Drive	Bismarck, ND 58504	701.250.4330
Fallon, NV	Great Basin PMC	2055 Schurz Highway	Fallon, NV 89406	775.423.7957
Corvallis, OR	Corvallis PMC	3415 NE Granger Avenue	Corvallis, OR 97330	541.757.4812
Nacogdoches, TX	East Texas PMC	6598 FM 2782	Nacogdoches, TX 75962	936.564.4873
Kingsville, TX	Kika De La Garza PMC	3409 North FM 1355	Kingsville, TX 78363	361.595.1313
Knox City, TX	James E. "Bud" Smith PMC	3776 Farm Road 1292	Knox City, TX 79529	940.658.3922
Pullman, WA	Pullman OMC	PO Box 646211, WSU	Pullman, WSU 99164	509.335.6892
Alderson, WV	Alderson PMC	PO Box 390, Old Prison Farm	Alderson, WV 24910	304.445.3005

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